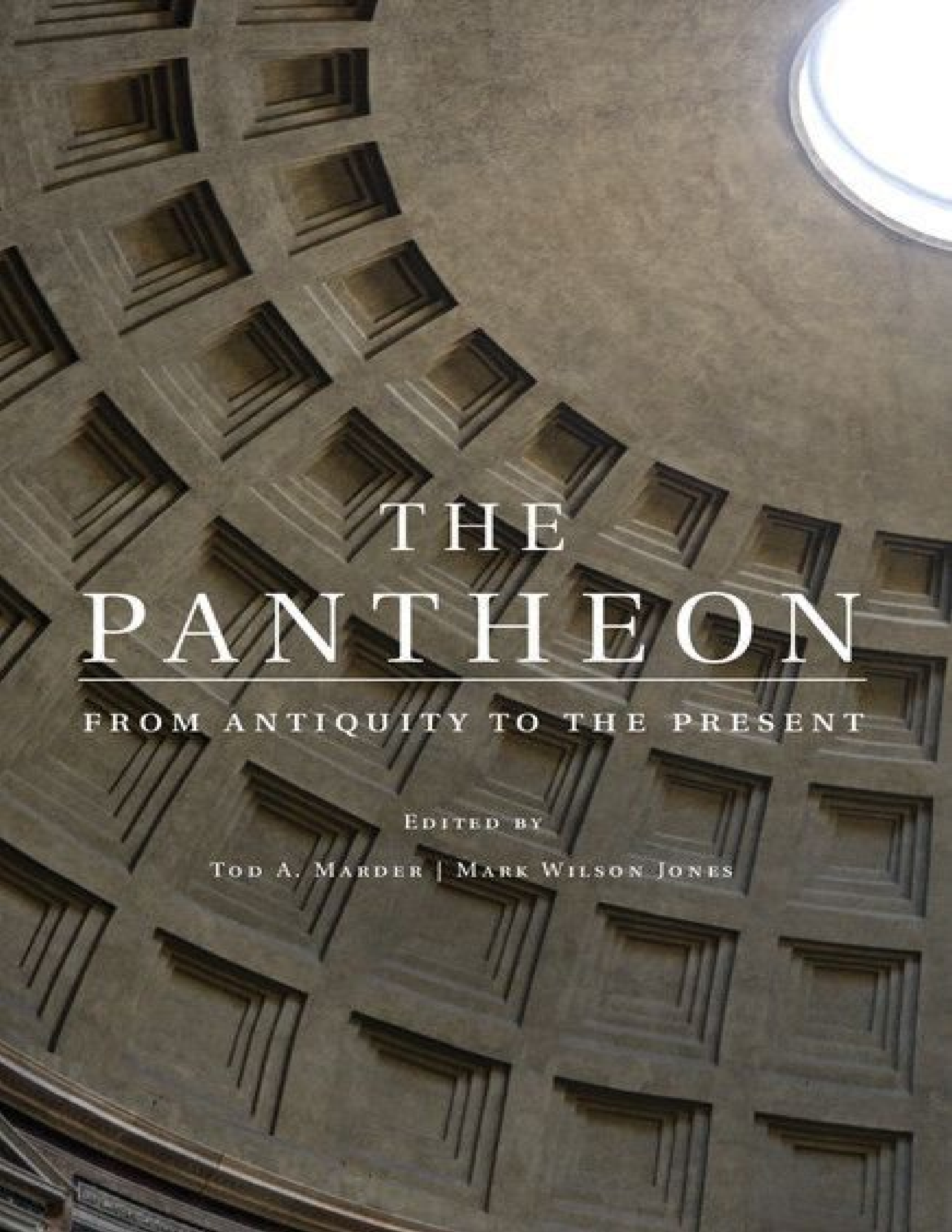

THE PANTHEON

FROM ANTIQUITY TO THE PRESENT

Edited by

Tod A. Marder | Mark Wilson Jones

The Pantheon

The Pantheon is one of the most important architectural monuments of all time. Completed by Emperor Hadrian in approximately AD 125 on the site of its Augustan predecessor, it brilliantly displays the spatial pyrotechnics emblematic of Roman architecture and engineering. *The Pantheon* provides an up-to-date account of new research on this best preserved of all ancient buildings from the time of its construction to the twenty-first century. Each chapter addresses a specific fundamental issue or period; together, the chapters shed light on essential aspects of the Pantheon's creation and establish the importance of its checkered history for the understanding of its ancient fabric and heritage, its present state, and its special role in the reception of ancient architecture and the very image of modern Rome.

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Contents

List of Plates and Figures

Plates

Figures

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Note on Usage

Throughout this book "Rotunda" is used to refer to the whole building. The lowercased term "rotunda" is used to refer to the cylindrical body of that building with its domical vault.

One Introduction

Tod A. Marder and Mark Wilson Jones

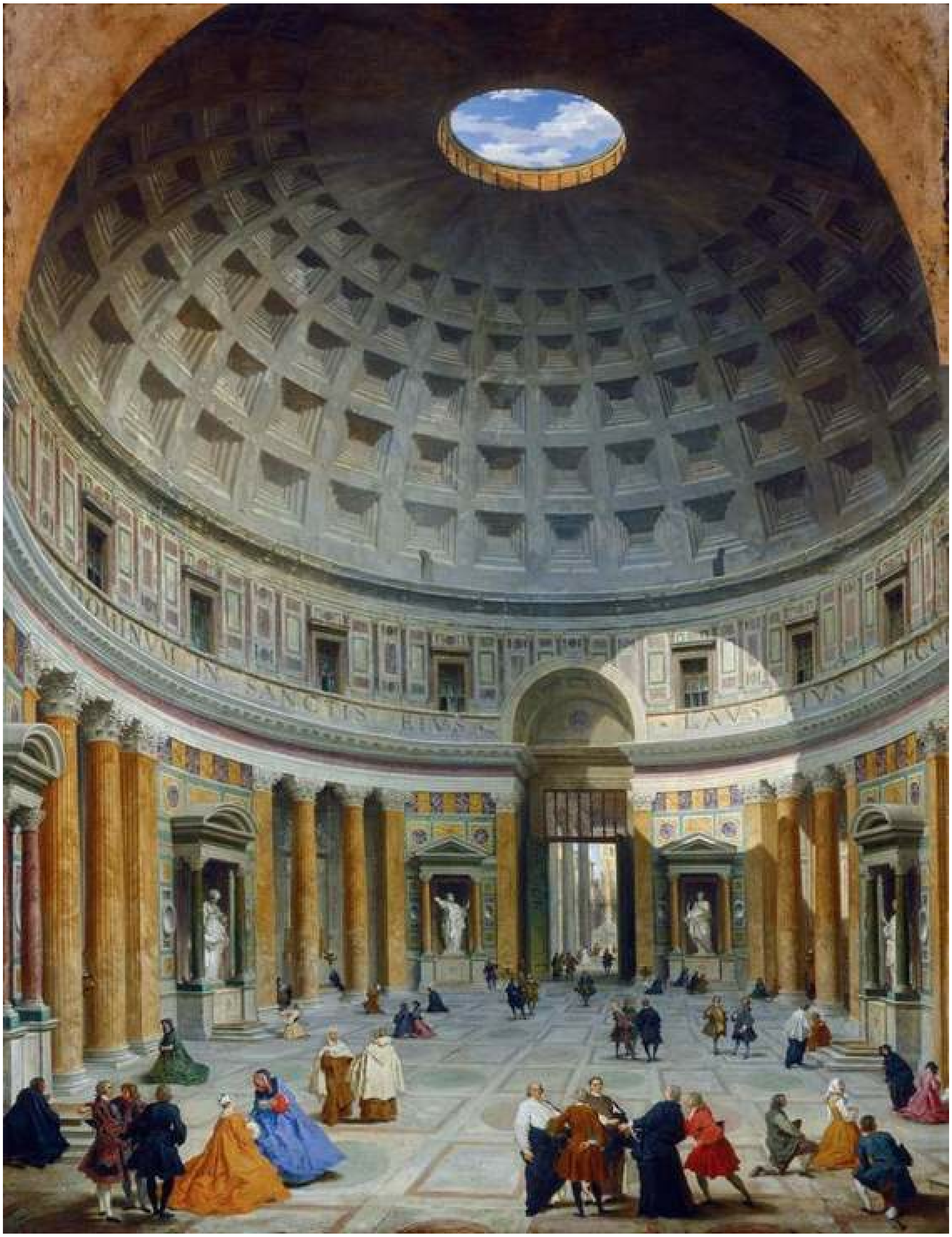
Astonishing for its scale and magnificence as for its preservation, rich in history and meanings, the Pantheon exerts a perpetual fascination. Written accounts, visual representations, and architectural progeny from late antiquity to our day combine to create a presence at once unique and universal in the Western architectural tradition. The Venerable Bede declared that whoever leaves Rome without seeing the Pantheon leaves Rome a fool, and this dictum seems no less valid for our time than when it was first uttered, according to legend, in the eighth century. Visitors may marvel at its unexpected majesty even as they experience a sense of déjà vu, having already encountered its resonant reflection in buildings from other epochs on different continents. Indeed, the Pantheon straddles the history of Western architecture like a colossus, its influence perhaps more pervasive than for any other single building in history (Fig. 1.1, Plate I).[1]

1.1. View of Pantheon facade, piazza, and fountain. (The Bern Digital Pantheon Project, BERN BDPP0101)

I. Exterior view of the Pantheon. (Photo Roberto Lucignani)

This influence has been generous and elastic, inspiring not only copies but creative reinterpretations like Hagia Sophia in Istanbul, St. Peter's in Rome, the Capitol in Washington, and the Parliament of Bangladesh. No less diverse are the associations that such projects exploit, which can be sacred or secular, political or religious. Simultaneously a symbol of cultural stability or revolutionary change, the Pantheon is a remarkably vigorous and mutable icon.[2]

The fame of the Pantheon is of course bound up with its imagery, and its imagery with its structure. It can be appreciated as much for its technical as for its aesthetic achievements, insofar as these aspects may be separately considered. In the fourth century BC, Ammianus Marcellinus likened the space embraced by the dome to a whole city district, so capacious was its visual effect (see Plate II). In the mid fifteenth century, John Capgrave thought that the dome must have been constructed over a vast mound of earth, as had been proposed for the Cathedral of Florence. In both instances, we are told, coins would have been embedded in that mound so as to ensure its removal by the greedy populace.[3] A medieval tradition held the Pantheon to be a work of the devil – since it so clearly exceeded the reach of mortal capabilities, who else could have built it? From a Renaissance perspective more in tune with ancient ideals, Michelangelo arrived at the opposite conclusion: for him, the design was "angelic, not human" and thus divine. In truth, there is something about both pronouncements that makes us think of the Pantheon as if it were, sui generis, a work of nature (even divine nature) like an alpine peak or chasm, appealing as much to those with romantic or religious sensibilities as to those favoring unemotional analysis.



II. Interior of Pantheon; painting by Giovanni Paolo Pannini, 1747. (Washington, DC National Gallery of Art, Samuel H. Kress Collection 1939.1.24)

The Pantheon is miraculous, too, in its state of preservation; as a totality it is the best preserved of any ancient Roman monument with a significant interior space. While it is tempting to explain its survival as a result of its Christian rededication, its compelling scale and aesthetic qualities were arguably the agents that attracted worshipful Christians in the first instance, not to mention antiquarians and architects, both dilettante and professional, throughout the ages. Thus, while countless Roman structures were pillaged for building materials with scant regard for their survival, the Pantheon enjoyed a degree of protection as much due to its intrinsic architectural values as to its ecclesiastical status.

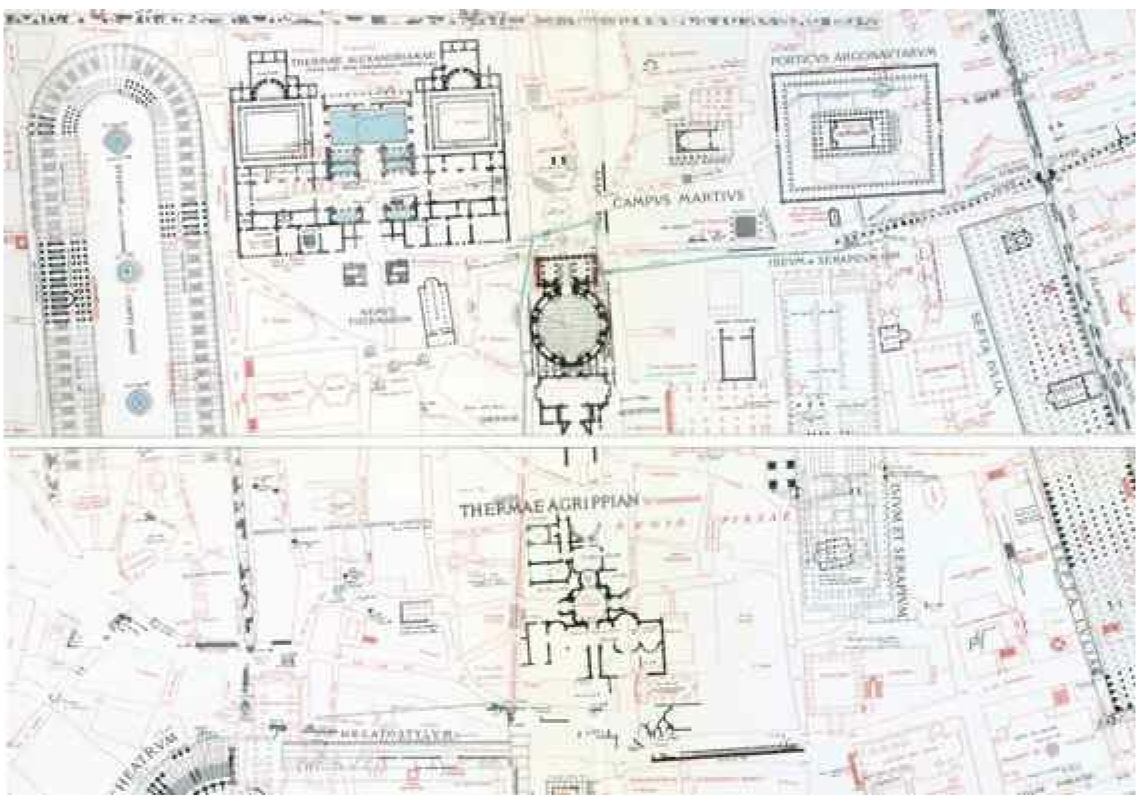
Despite its unique stature, however, the Pantheon continues to pose enigmas in design and

intention, and many of its basic historical and technical premises remain uncertain, debated, or simply unexplained. Unlike the Parthenon in Athens, San Vitale in Ravenna, Notre Dame Cathedral in Paris or St. Paul’s in London, there is relatively little to say that is absolutely certain and indisputable about the origins, chronology, and construction of the Pantheon. Even its very name and purpose are still subject to discussion; so too are formal and symbolic readings of the building.

The present volume thus addresses an enticing but daunting prospect as it seeks to make or consolidate progress over these questions, while setting out the current state of research on major aspects of the Pantheon’s fabric and its history for the benefit of a wider public. The dual focus is, accordingly, the physical structure of the monument and its reception down to the present day.

First Concerns

The building known as the Pantheon is located in the neighborhood of Rome called the Campus Martius, or in modern Italian Campo Marzio. Literally the field of the war god Mars, the place where military exercises were once held, this district was progressively urbanized in the late Republic. By the end of the first century BC, various public structures serving religious cults and secular entertainments, including temples and altars, theaters, stadia, baths, and parks, were located here. Situated in the heart of today’s historic center in the most densely inhabited part of Rome in the Middle Ages and the Renaissance, the Pantheon still dominates Piazza della Rotonda, whose irregular shape has been molded over the ages by the public and private forces that typically strain urban geometry. Running mostly north–south and east–west, the narrow streets leading to the piazza offer varied frontages dating from early modern times, yet preserving all the while the basic ancient urban pattern, as is apparent when superimposed on a modern plan (see Plate III).[4]



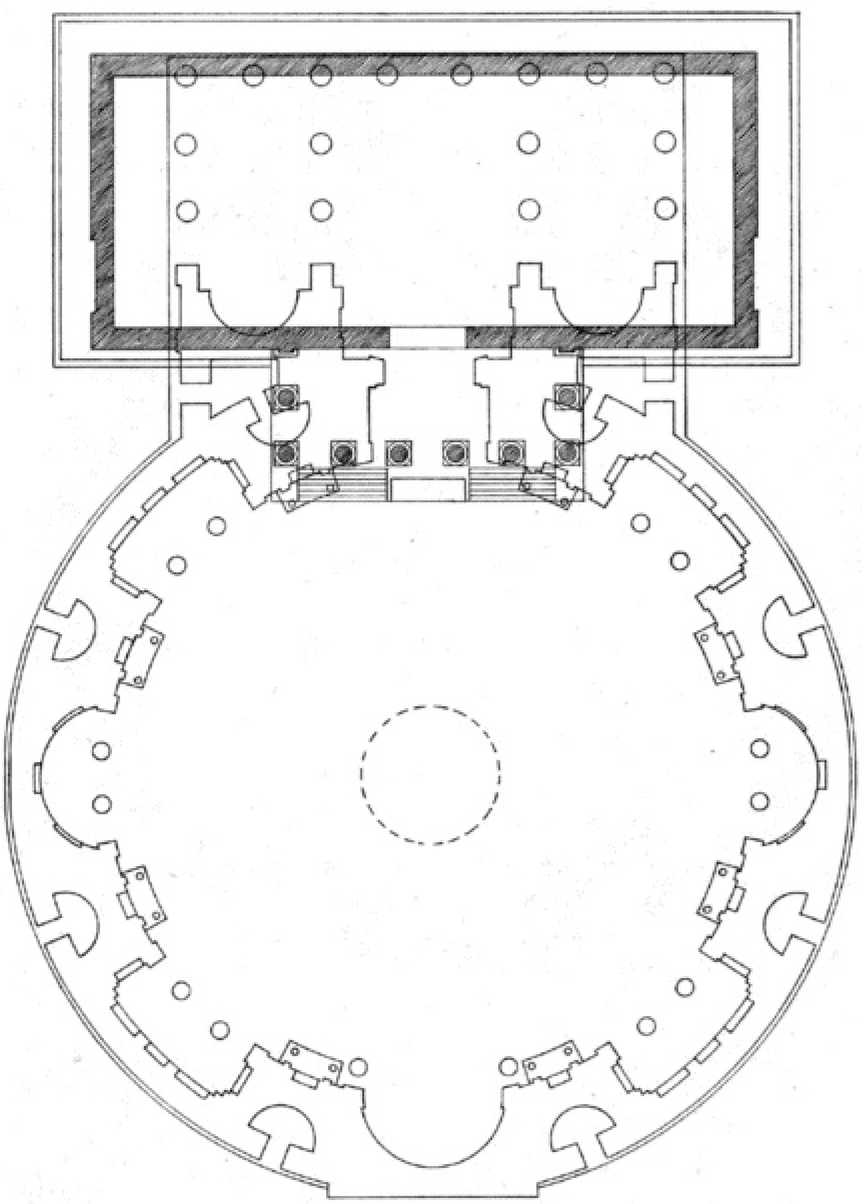
III. Plan of Pantheon and urban context. (Lanciani repr. 1988)

The name "Pantheon" probably derives from the Greek*pantheon*, a term that conveyed different but related meanings, whether a temple of all the gods, a temple of the 12 Olympian gods, or a temple in which the image of a ruler stood in the company of such divinities. For although there are textual clues, it is tradition more than anything else that explains our use of this name for a structure whose original purpose remains uncertain. In truth, we cannot even be absolutely sure that the Pantheon was a temple, as most scholars believe on account of some temple-like characteristics, most notably the great pedimented front. It is also significant that several ancient sources do refer to the building as a temple, and yet a passage from the life of Hadrian cites buildings that he restored, and it includes the Pantheon with wording that could be read to mean that it was not in the category of temples.[5] Roman temples typically had altars in front of them, but no altar has ever been discovered in front of the Pantheon. In 1986, Paul Godfrey and David Hemsoll offered a series of further observations tha question the temple label. The great domed interior, for example, has similarities to the halls of imperial baths and palaces, while later buildings that imitated it were often mausolea.[6] Few Greek or Roman temples are circular, and those are relatively small in size; moreover, Roman temples generally honor one divinity per room, explaining why temples of multiple deities (for example, the Capitoline temple) have multiple cellae. Given its shape and size, the Pantheon can therefore be seen, at the very least, to stand outside normal temple typologies.

Part of the problem of pinning down the function of the Pantheon is bound up with that of correctly interpreting the first building constructed on the same site. This was completed in either 27 or 25 BC by Marcus Agrippa, the great consul, general, and statesman who served under the first de facto emperor, Augustus, as we can deduce from the inscription below the pediment of the present monument: "M(arcus)·AGRIPPA·L(uci)·F(ilius)·CO(n)S(ul)·TERTIVM·FECIT" (Marcus Agrip son of Lucius, thrice consul) (Fig. 1.2).[7]

1.2. View of the Pantheon from the front, at high level. (The Bern Digital Pantheon Project, BDPP0114)

From the beginning of the twentieth century Agrippa's Pantheon was generally thought to be a rectangular building that faced south rather than north as does the present structure (Fig. 1.3). More recent scholarship suggests instead that the Agrippan fabric was in fact oriented toward the north, and that its plan likewise combined a round space with a portico. This being the case, the Agrippan plan, discussed in Eugenio La Rocca's chapter, would have forecast the outline of the present building. Although it would become one of the staples of architectural typology, at the time the combination of three distinct geometric elements was relatively novel: a circular rotunda, a rectangular portico, and a fabric that mediated between them (generally known in English as the transitional or intermediate block). It is possible that this scheme developed from precedents in the Greek East; in particular, La Rocca discusses the possibility that the Tychaion, a sanctuary in Alexandria named after Fortune, may have inspired Agrippa's building. Knowledge of it may have come to Rome in the wake of the defeat of Anthony and Cleopatra by Augustus (then called Octavian) and his admiral Agrippa at the battle of Actium in 31 BC.[8] This notion would be consistent with the suggestion by Filippo Coarelli that the Pantheon was sited on the ancient palus Caprae, where according to one tradition Romulus, legendary founder of Rome, became the god Quirinus and ascended to the heavens. Agrippa would therefore have intended a programmatic connection between the founder of the city and a new Rome in the age of Augustus.[9]



1.3. Plan of Agrippa's Pantheon facing south, orientation now in question. (Kähler, *Der römische*

Tempel 1970, after Beltrami 1898)

This much can be said with certainty: with its north-facing orientation, Agrippa's Pantheon was aligned axially with the entrance to the Mausoleum of Augustus about half a mile away, a critical relationship that encourages its interpretation as a dynastic sanctuary (see Plate XVI). This pairing accords with a passage by Dio Cassius, a consul of the third century, which states that Agrippa intended to honor the emperor by dedicating the building to him and erecting his statue inside, but Augustus disapproved. Agrippa therefore placed a statue of the deified Julius Caesar (Augustus's adoptive father) in the building along with those of the Olympian gods, including Venus and Mars, whereas statues of himself and Augustus were set up in the porch, presumably in the two great niches. As La Rocca's chapter argues, Dio's remark and other evidence show that the Pantheon had a special place in a sophisticated program celebrating Augustus and anticipating his future divinization. None of the statues has survived, nor do we have later notice of them. It is safe, though, to assume that Venus, Mars, and Julius Caesar were accompanied by other statues disposed in the exedras and aedicules of the rotunda. It is also likely that the statues of divinized members of the imperial family were added to the original deities from time to time, as the initial dynastic aspect of the program evolved into a celebration of the imperial institution and its divine authority.

Agrippa's Pantheon was damaged by fire in AD 80, restored to some unknown extent by the emperor Domitian (AD 51–96), struck by lightning and burned again in AD 110, before being rebuilt in its present form and completed around AD 125–128 during the reign of Hadrian (AD 117–138). This building was then refurbished in AD 202 under Septimius Severus (AD 193–211) and Caracalla (AD 211–217), as is indicated in an inscription on the facade carved in small letters under the Agrippan inscription.

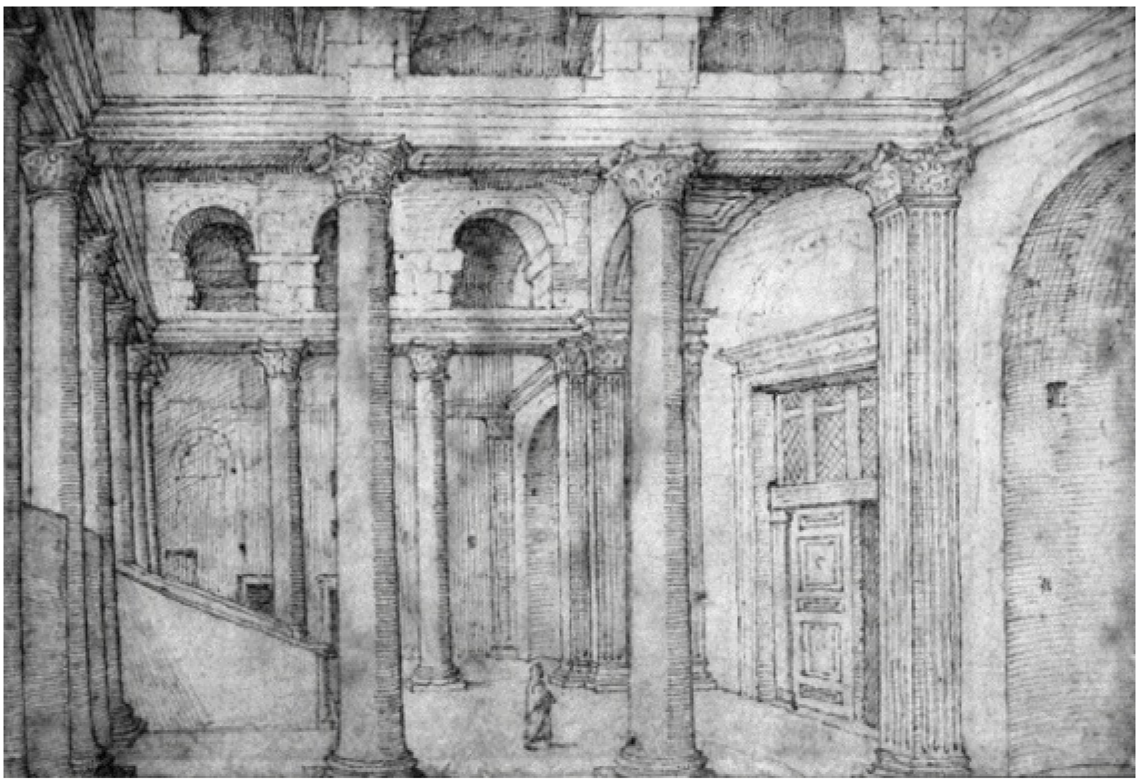
Given the inscription's prominence, Agrippa's patronage of the present building was generally accepted until 1891–1892, when excavations revealed traces of an earlier building under the porch and a polychrome marble pavement under the rotunda. The impetus for these excavations came from the work of a young French architect, Georges Chédanne, a *pensionnaire* at the French Academy in Rome, who overturned prevailing assumptions by assigning the Pantheon to Hadrian's reign on the basis of brickstamps belonging to the structure.[10] (Roman brickmakers often stamped one brick per batch with information that in effect yields a date range and sometimes the precise year of manufacture.) This drastic revision resituated the building firmly in the period of the Roman Empire during a time of great architectural innovation in the use of the very sort of concrete technology that the Pantheon exemplified. The inscription below the pediment was newly understood as a gesture of respect recalling the earlier Agrippan fabric, thus commemorating the original builder as Hadrian supposedly did in other rebuilding or restoration projects. Chédanne's conclusions met with a sympathetic echo at the time in the research of Heinrich Dressel, the first systematic scholar of brickstamp evidence, and they were confirmed in the major modern study of brickstamps by Herbert Bloch in 1948.[11]

Lately, a new interpretation has emerged, questioning the data and proposing that many of the bricks from the Pantheon previously thought to be Hadrianic are in truth datable to the end of the reign of Trajan (98–117). Indeed, on the basis of a rigorous reappraisal of the facts, presented in this volume by Lise Hetland and already the subject of scholarly excitement, it now seems that just one of the 90 stamps from the monument catalogued by Bloch can be dated to Hadrian's reign with absolute

confidence. Thus, we face some forceful evidence for attributing the planning and inception of the Pantheon earlier, to Trajan's reign, with only its completion owed to his successor Hadrian.

The Porch

As Rome declined and the city shrank from the boundaries of its ancient walls after the fourth century AD, the decay and collapse of buildings, the repeated flooding of the Tiber, and the demise of drainage systems produced an inexorable rise of the ground level. As a result, instead of standing proud of its surroundings as it once did, the Pantheon now lies somewhat depressed in the urban tissue. Excavations carried out in the Piazza della Rotonda in front of the porch in 1997–1998 revealed the ancient pavement level lying some two meters below the modern level.[12] The disparity between the ancient and modern pavement levels was, as we shall see, even more pronounced in the Renaissance, when visitors had to descend about seven steps from the surrounding ground level to reach the floor of the portico (Fig. 1.4).



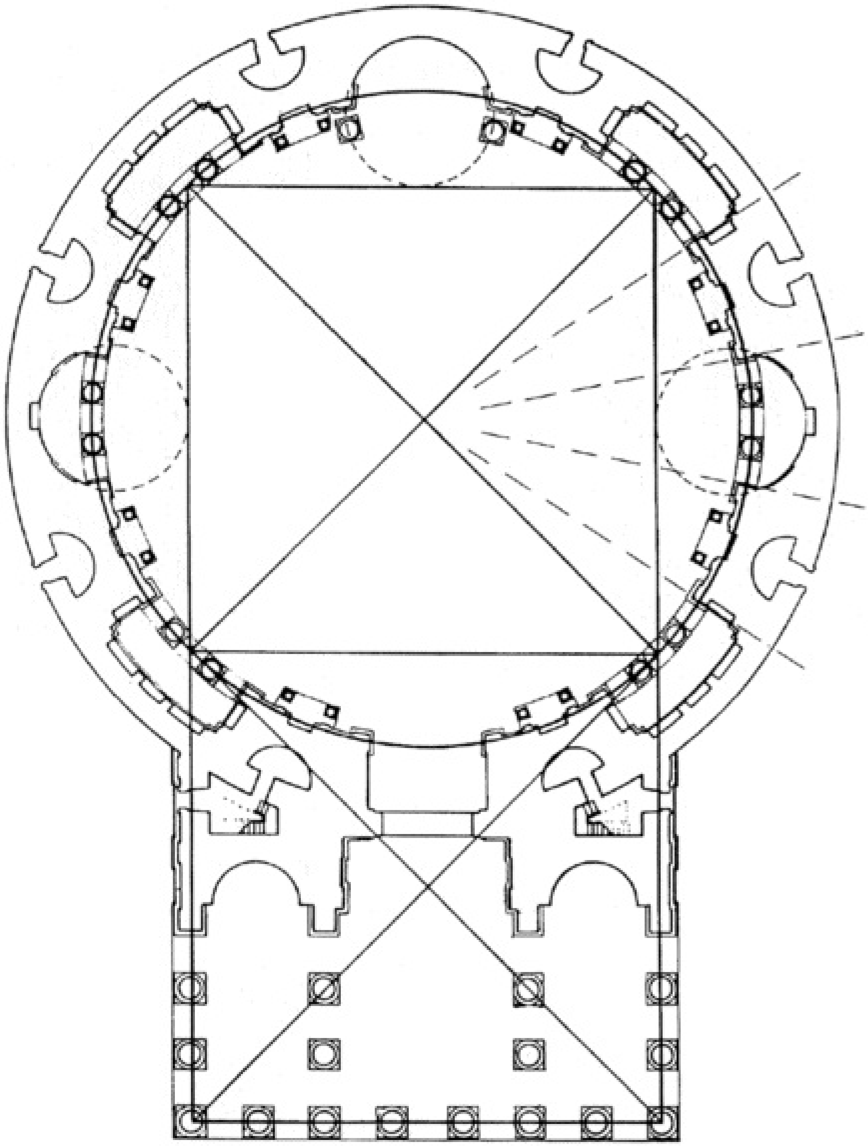
1.4. View of portico interior; drawing by Maarten van Heemskerck, ca. 1532–1536. (Berlin, Kupferstichkabinett, Roman sketchbooks, vol. 2, fol. 2 recto)

The eight columns that define the facade of the Pantheon stand in front of eight more columns arranged so as to form two aisles and a central passage. The total of 16 columns, together with the four square antae that mediate between the portico and the transitional block, support an entablature and a tile-covered roof that is fronted by the imposing pediment.[13] All stonework divides into two kinds: near-white marble from the quarries on Mount Pentelicon near Athens (the same marble that was used to make the Parthenon and its sculptures) and granite from Egypt. The granite came, in turn, from two quarries, the rose or pink granite from Aswan and the gray granite from the more remote quarry at Mons Claudianus, located between the Red Sea and the Nile. The eight columns of the front have shafts of the gray hue, while the other eight have shafts of pink, though due to patination and

grime, the chromatic variation can seem marginal in some light conditions. In both cases, the shafts are each of a single piece (save for a few repairs), that is to say, monoliths weighing 50 tons. The pediment carried by the columns and the entablature with the inscriptions no doubt displayed a symbolically charged decoration in bronze, as implied by the presence of numerous fixing holes. Their pattern has led to the inspired yet unprovable reconstruction of a civic honor in the shape of a crown of oak leaves (*corona civica)*, combined perhaps with an eagle alluding to the apotheosis of mortals to the immortal realm.[14]

The roof over the portico runs back to interrupt a secondary pediment applied to the surface of the transitional block, creating a compositional oddity that inspired the invention of a new kind of church facade in the sixteenth century. This unusual configuration, together with certain anomalous characteristics in different parts of the portico, especially the unhappy resolution of its meeting with the rotunda at the transitional block, represents a long-standing source of puzzlement. A controversial recent theory, advocated here on the basis of fresh corroborative evidence in Chapter Seven, proposes that the initial plan called for columns of even greater size, each weighing no less than 100 tons. For some unexplained reason (possibly a disaster such as a shipwreck), the columns originally intended were lost, and construction proceeded with the smaller-size columns we see today, a change that could help to explain the various anomalies of the portico as executed.[15]

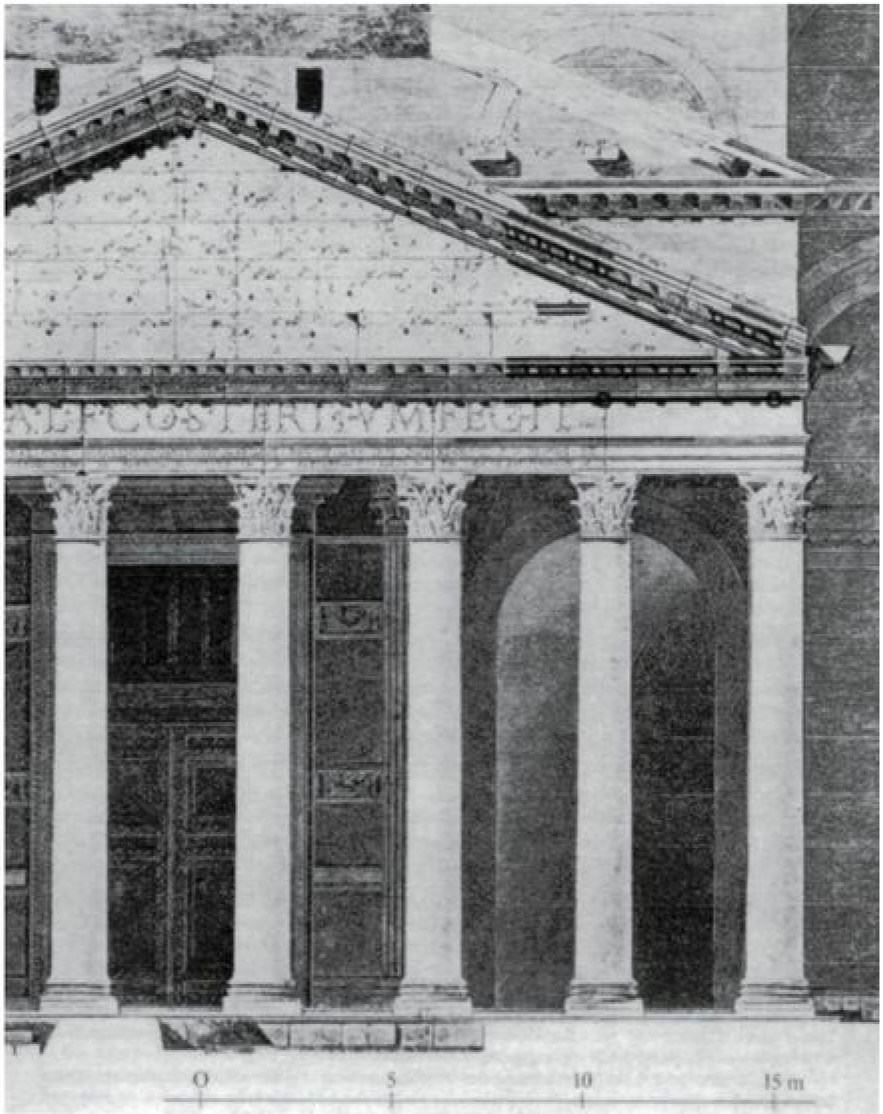
Analysis of the design of the portico and its geometry and proportions is rendered more complex by this theory, but either way, it is possible to observe the harmonious numerical simplicity of proportions that is an enduring hallmark of monumental Roman architecture. As built, for example, the columns conform to the conventional rhythm known as *systyle*, in which the space between the columns is double their diameter, whereas the originally intended rhythm would have been *pycnostyle*, with the space between the columns being one and a half times their diameter. The overall scheme for the portico and transitional block meanwhile is one of archetypal simplicity, with a total height that matches its width (as measured between the centers of the corner columns) (Fig. 1.5).[16]



1.5. Schematic geometry of the Pantheon. (Wilson Jones 2000, Fig. 9.11)

Such observations come from a scrutiny of surveyed measurements understood in the light of surviving ancient textual evidence, above all the treatise on architecture by the Roman architect and writer Vitruvius (ca. 80–70 BC–after 15 BC) that was completed not long after the building of Agrippa's Pantheon. We also have direct physical evidence for explaining how the actual design of the present building was carried out, how its stones were measured, and how they were cut. This evidence, which is another recent discovery, takes the form of a set of ancient Roman profiles for the portico etched full scale into the limestone paving that lies in front of the Mausoleum of Augustus (Fig. 1.6, a and b). As Lothar Haselberger has shown, parts of these templates match the features of the Pantheon pediment so closely that we can presume they were used in the process of shaping the stone and other materials unloaded from barges at this site, which had long hosted docking facilities for commodities that moved up and down the Tiber River.[17] The templates include such details as the exact column spacing of the portico according to the executed dimensions and the configuration of the bracket-like modillions punctuating the cornice. The profiles seem to forecast the use of the Corinthian capitals, although, if truth be told, the size indicated is too big with respect to those of the actual building and yet, by an uncanny coincidence, just the right measure for the original columns posited for the project.

(a)



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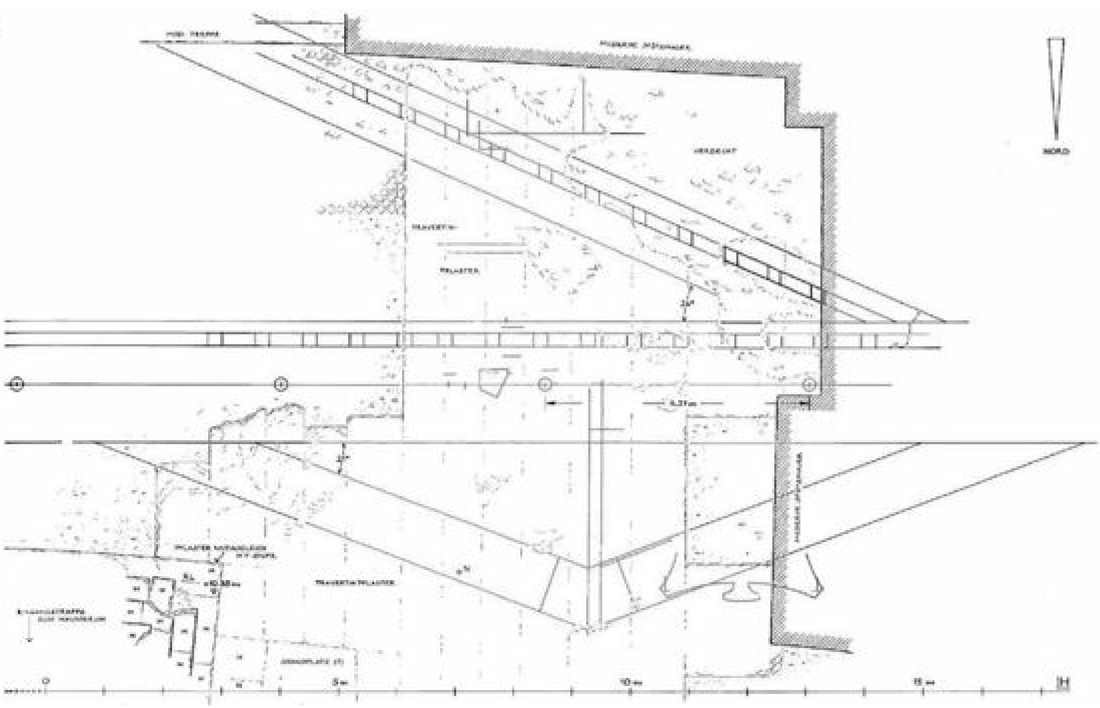
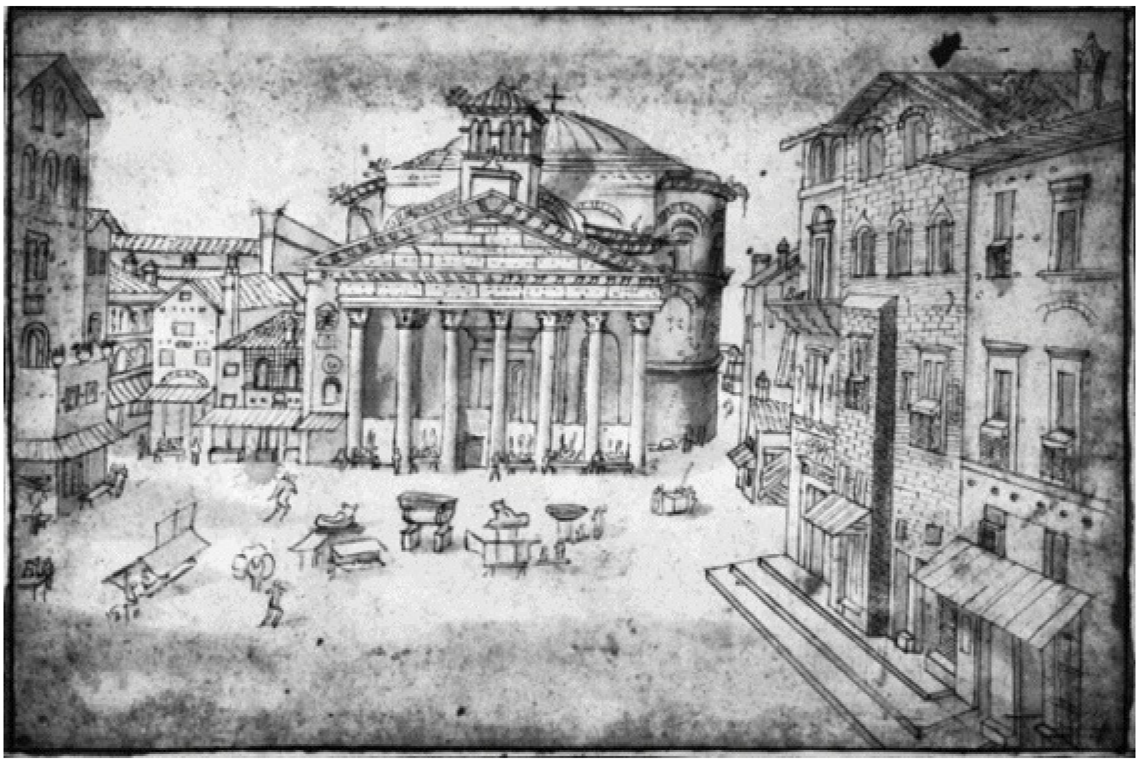


1.6. a) West corner of pediment (Haselberger 1994, Abb. 5), and b) full-scale etching of profiles for portico elevation, limestone paving in front of Mausoleum of Augustus. (Haselberger 1994, Abb.

1)

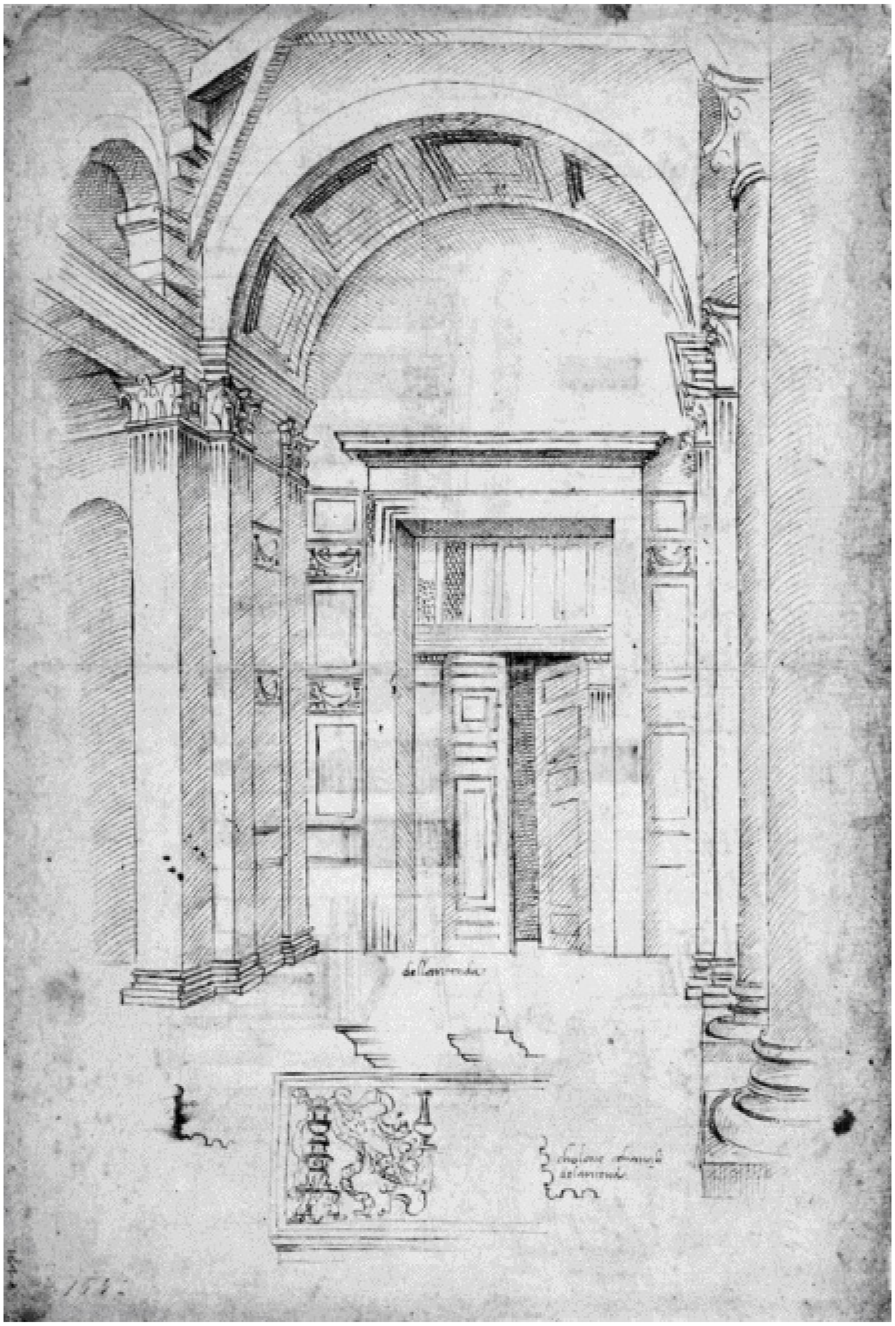
By means of the same template, we can restore the original outline of the capitals, nearly all of which have suffered serious damage over time. Here, as is generally the case, damage to the fabric of the Pantheon has been more the result of human intervention than time or natural causes. The whole portico was colonized, mutilated, and added to repeatedly down the centuries, culminating in the disappearance of the three east columns at some as yet unknown date (Fig. 1.7). Popes Urban VIII Barberini (1623–1644) and Alexander VII Chigi (1655–1667) replaced the columns in campaigns with their own historical contexts. That of the Barberini also involved the stripping of bronze trusses from the roof of the portico and their replacement with timber, leading to the famous pasquinade, *Quod non fecerunt barberi, fecerunt Barberini* ("What the barbarians didn't do, the Barberini did"). The fuller context is recounted in the following and more extensively in the chapter on the Pantheon during the seventeenth century.



1.7. Exterior view of Pantheon; anonymous sixteenth-century drawing. (Louvre inv. 11029 recto)

Suspended from the original bronze trusses there may have been great barrel-vaulted ceilings likewise made of bronze, with a larger vault for the central nave and smaller ones for the flanking aisles.[18] The effect of the central vault can be visualized most easily by imagining the coffered barrel vault presently over the entrance portal extending across the vestibule as it was depicted in the sixteenth century (Fig. 1.8). The only ancient assembly of bronze that does survive at the Pantheon is the grandiose portal made of two opening leaves slung on vertical pivot hinges framed by fluted pilasters at the sides, with an open grille overhead.[19] All of this fits within the 20-by-40-foot opening in the masonry, while the threshold is one of the largest single pieces of stone in the whole edifice, a slab of highly prized blood-and-black *africano*, 20 feet long, 5 feet wide, and of unknown depth. The fact that the door leaves do not fill the opening without the grille, along with some stylistic clues, suggests that they could have been reutilized from some earlier building. While this may not have been the Pantheon of Agrippa itself on account of the two intervening destructive fires, an allusion of continuity may nevertheless have been intended, in keeping with the restitution of Agrippa's name in

the main inscription. This notion is strengthened by the presence of candelabra, festoons, ribbons, and religious utensils carved in the friezes that run at intervals around the walls of the transitional block, as these second-century AD decorations recall comparable motifs used for the first time on Augustan monuments.[20]



1.8. Door and vault in portico; drawing by Raphael. (Uffizi A 164 verso)

The Intermediate Block

The link between the porch of the Pantheon and the rotunda is formed by the so-called intermediate or transitional block. These names reflect the fact that its form had to mediate between the rectilinear geometry of the portico and the circular geometry of the rotunda.[21] This is the main explanation for the very existence of the intermediate block; it had no known use other than to house a pair of staircases that rise up the full height of the structure to give access to the roof. At a high level, the stairs also provide the means of entry to a group of rooms later occupied by the Accademia dei Virtuosi, an association of artists that was based here since the sixteenth century. In antiquity, these spaces were

no doubt put to use, but there is nothing to tell us how that use factored into their creation.

The intermediate block is built of brick-faced concrete, whose exterior is still covered in some places by dressed stone and decorative elements (Fig. 1.9). These decorations consist of fluted pilasters and the series of friezes already mentioned that are carved in relief on three-foot-tall slabs of marble varying in length and arranged as two horizontal bands on the intermediate block, as well as three bands to either side of the entrance portal. Originally 28 in number (10 on both flanks and 8 by the entrance), each of the reliefs shows a garland slung between two candelabras, with small religious utensils represented as though hovering over the garlands in the center.[22]

1.9. Exterior of intermediate block, west side. (Photo Mark Wilson Jones)

The top of the intermediate block is capped by a cornice with simple S-shaped modillions that continues around the rotunda as a unifying device. However, other aspects of the composition in this area of the building undermine its unity. The superimposed outline of a pediment with raking cornices bearing similar modillions on the front (north) face of the block is cut into by the roof of the portico and rendered incomplete, as already observed. Meanwhile, the marble entablature over the columns, with its more elaborate smaller modillions, runs down the sides of the intermediate block and dead-ends unceremoniously at the rotunda without any corresponding architectural feature on the curved body of the building.

The formal distinctions between the rotunda and portico and their imperfect resolution in the intermediate block were so pronounced in the eyes of Renaissance viewers that they believed the rotunda and the porch to have been conceived at different times, with the intermediate block usually being associated either with one or the other. An evident interruption in the structural bonding of the transitional block with the rotunda supported this notion. Some informed observers dated the rotunda to the Republic and considered the portico a later addition under Agrippa. Still others thought that Agrippa must have built the rotunda during the reign of Augustus, while the portico should be attributed to later emperors, either Hadrian or Antoninus Pius or Septimius Severus, for all of whom

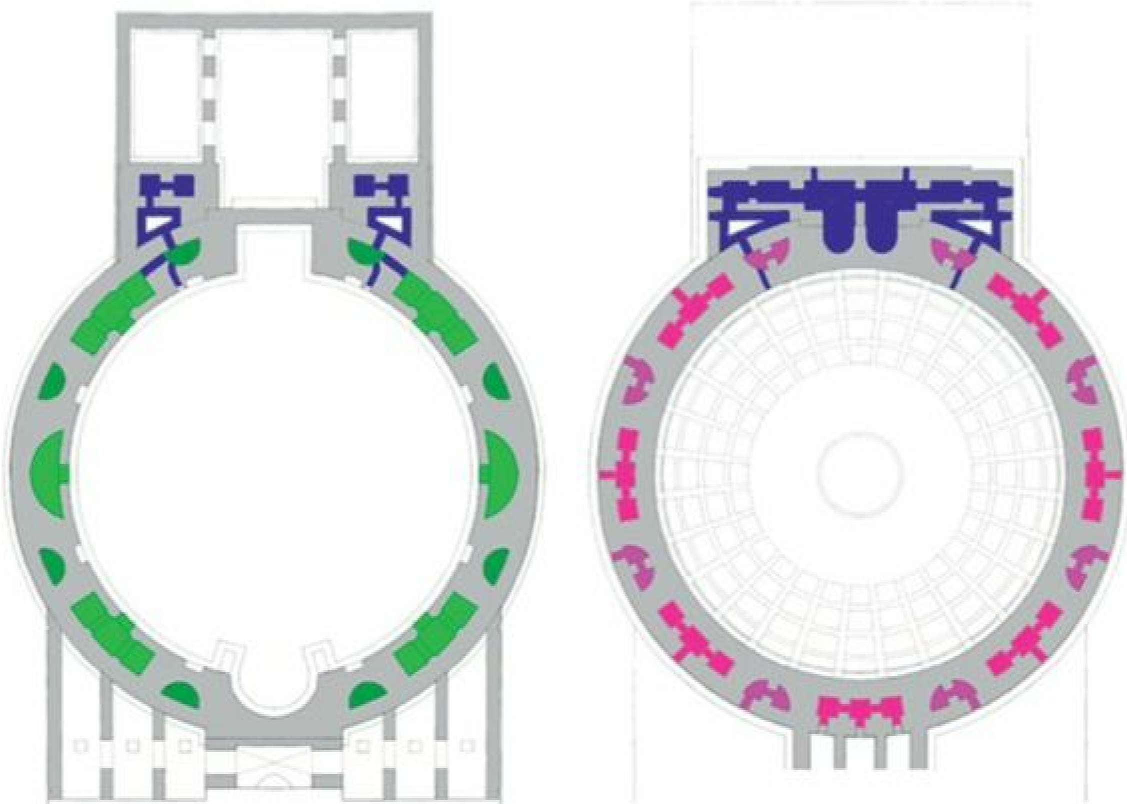
there was some epigraphic and literary testament. Yet a third camp of observers insisted that the portico was Agrippa's and so came first, the rotunda having been somewhat clumsily added to it.[23] These theories help to explain why the dating of the transitional block and indeed the entire monument has oscillated from one era to another in the eyes of different scholars.

After the 1890s, all this had to change with the arrival of the brickstamp analyses of Chédanne and Dressel, which seemed to date the whole building firmly to the reign of the emperor Hadrian.[24] Momentarily leaving aside the question of the starting date, Hetland's review of the evidence is significant in confirming that the construction of the rotunda and intermediate block were contemporary, at least at lower levels. This conclusion is clinched by a detail that escaped earlier publications of the building: the presence in the staircase of so-called bonding courses of large, double-size bricks, or *bipedales*, that traverse the tissue of the rotunda on one side and the intermediate block on the other (see Chapter Seven and Plate XXIII).[25] Despite past interpretations, one thing is now clear: the transitional block belonged to a single project along with the rotunda and the portico.

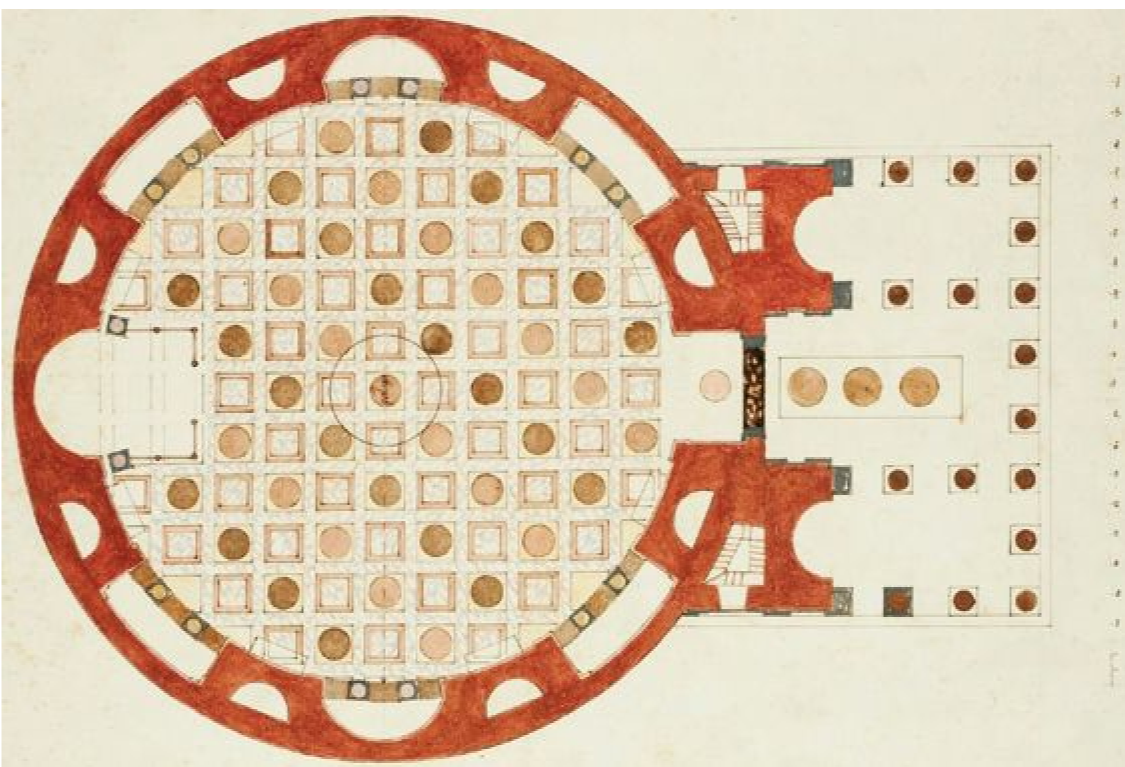
The Rotunda and Dome

It is fair to say that most modern visitors find the expansive domed interior of the Pantheon to be its most impressive feature, and its crowning open oculus to be its most surprising. This gaping hole, 30 feet (about 9 meters) in diameter, admits light and air and even rain, but most importantly the ever-changing illumination created by the motion of the sun. There were precedents such as the so-called Temple of Mercury at Baiae, but the effect in the Pantheon is unrivaled as a sensory architectural experience (see Plate IX). Had the interior been built when the canonic Seven Wonders of the World were formulated, it surely would have been among their number.

The rotunda is a domed cylinder 55 meters in diameter, with an interior space nearly 44 meters wide spanned by a hemispherical dome. As was common in Roman centralized buildings, the circular geometry of the plan is articulated by two main orthogonal axes and two diagonal axes so as to create eight sectors like slices of a pie (see Plate V). The perimeter is articulated by large alcoves, or exedras, that seem as though they are carved out of the 20-foot-thick (6 meter) drum, leaving eight structural "piers" between them (see Plates IV and VI). On the cross axis, the exedras are semicircular, while on the diagonal axes their plan follows the curve of the rotunda. The main axis runs through the rectangular entrance space and terminates at the semicircular exedra that is the main apse (Fig. 1.10).

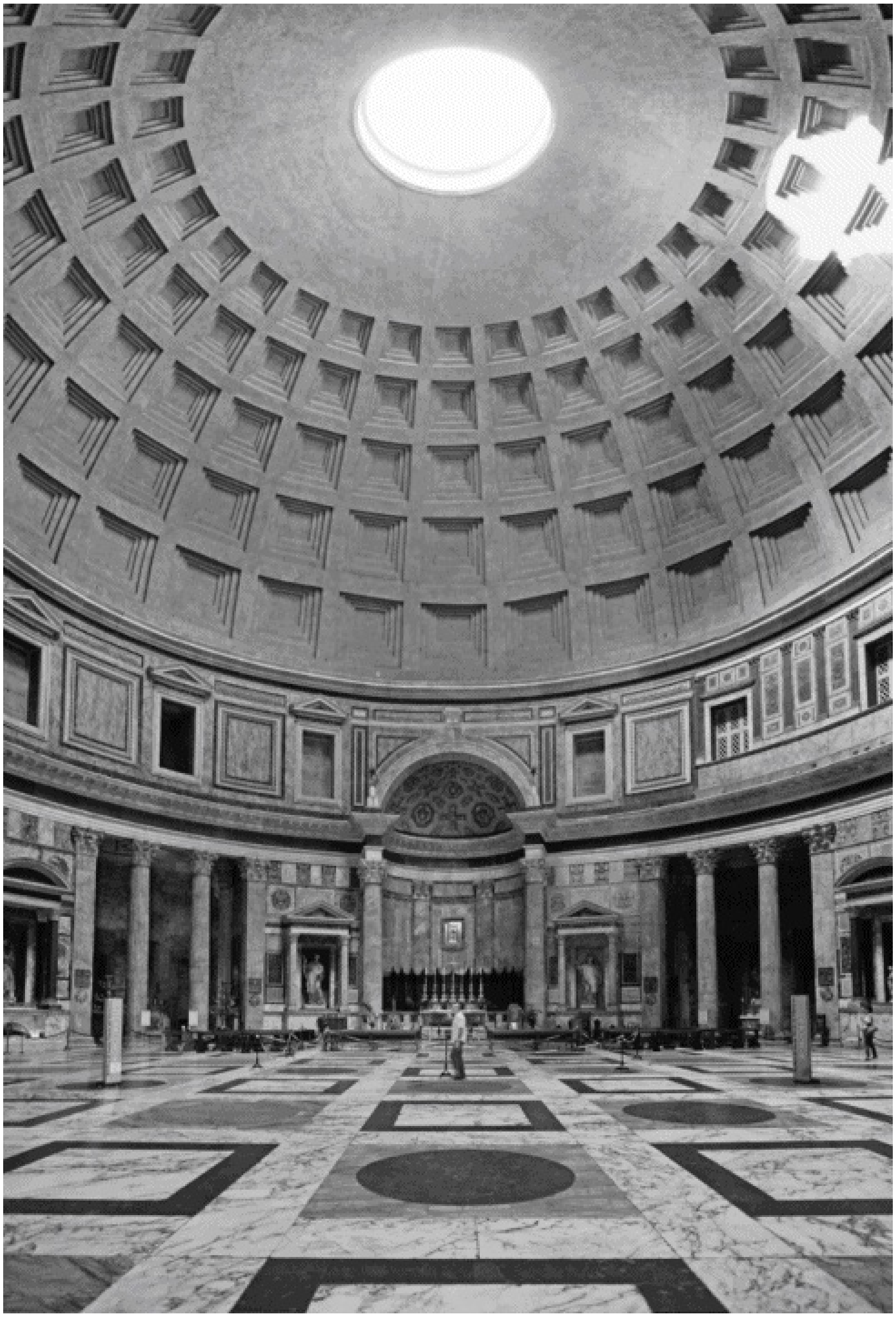


IV. Diagrams of cavities in the wall. (The Bern Digital Pantheon Project, BERN BDPP0087, drawn from information in Licht 1968)



V. Plan of pavement, niches, and high altar; anonymous seventeenth-century drawing associated with the Bernini workshop. (Biblioteca Apostolica Vaticana, Chigi P VII, 9, 108 recto)

VI. Interior view featuring pier with Raphael's tomb and flanking niches. (The Bern Digital Pantheon Project, BERN BDPP0069)


1.10. Interior seen along main axis. (Photo Maxim Atayants)

The paving of the interior consists of a pattern of circular disks and squares that reinforce the essential geometrical themes of the whole building. Framed within 10-foot squares and separated by 3-foot bands, these squares and circles alternate with each other on the cardinal axes, as they do in all rows parallel to the cardinals. As a result, sequences of either squares or circles run along diagonal rows with a line of disks traversing from one diagonal exedra to its opposing mate, and with a single roundel suitably locating the absolute center of the composition.

The interior elevation consists of three zones, or ranges. The lowest incorporates the main columns and pilasters standing on the pavement and capped with a full entablature, and its prominent cornice extending around the girth of the fabric, broken only at the entrance arch and the main apse. The middle, or attic level, occupies the rest of the wall up to the springing of the dome. Finally, the

uppermost zone consists of the coffered dome. A major unifying compositional feature is the use of prestigious colored marbles. The eye revels in what is in effect a "pantheon of marbles." Their varied and distant provenance – from modern-day Egypt, Greece, Turkey, and Tunisia – provides a visual reminder of the ample reach of Rome's imperial dominion, its unity, and its collective wealth.[26] The majestic Corinthian order provides another unifying theme for the interior and for the entire building. Corinthian columns with monolithic shafts measuring 30 feet high – three-quarters the height of those in the portico – screen the exedras from the central space. But rather than the smooth granite of the exterior shafts, these are fluted and made of colored marble: purple-veined ivory-colored *pavonazetto* from Turkey and salmon-honey-colored *giallo antico* from Tunisia in alternate exedras.[27] Pilasters rather than columns are employed to face the edges of the structural piers, in the middle of which are aedicules that must originally have housed some of the statuary in the building. In keeping with a sophisticated play of symmetries, the aedicules are of two types: those with triangular pediments were made of paler marbles while those with segmental pediments had a deep-hued polychromy. The columns and their pilasters carry Corinthian capitals whose marble, like that of the small pediments, comes from Carrara, the only stone employed in the Pantheon to come from Italy. The choice of this particular marble reflected its ability to hold very fine detail; indeed, these capitals are wrought with exquisite workmanship and such extraordinarily crisp finishing that they convey an almost metallic quality (Fig. 1.11).[28]

1.11. Corinthian capital from the interior. (Photo Maxim Atayants)

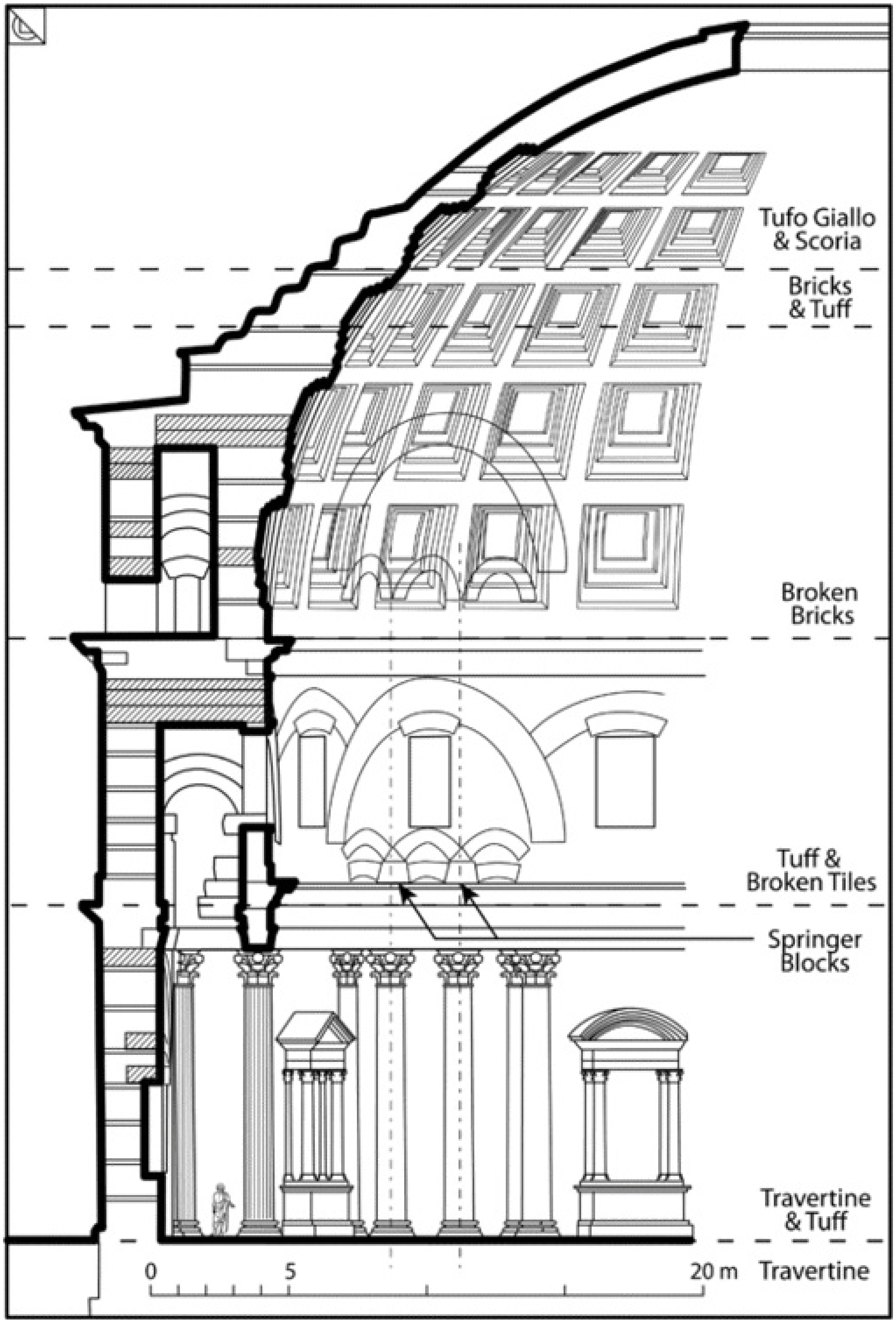
It is important to remember that the Pantheon presents today's visitor with a mixture of ancient materials and modern repairs and replacements. Some of these interventions are easy to identify, such as the coffering and other embellishments in the principal apse and of course any feature related to Christianity. In other cases, the ancient elements and their subsequent replications are less easy to distinguish. Detailed inspections and technical analysis during a campaign of conservation under the direction of Mario Lolli Ghetti in the 1990s have revealed the full extent of the renovations of the seventeenth and eighteenth centuries, when a substantial proportion of the ancient revetment was

replaced with thinner sheets of marble (often reworked ancient material) bonded to backing slabs of coarser stones. In Lolli Ghetti's estimation, roughly two-thirds of the floor is either modern or ancient material that has been relaid in modern times. Here and there are stones not known to antiquity, such as pieces of *giallo senese* from the environs of Siena, which replaced damaged portions of the more fragile giallo antico. Nonetheless, the general pattern of the pavement and its polychromy have been faithfully maintained.

Sadly, this is not true of the elevation of the rotunda. Ancient materials were removed not just because they had become damaged but also because they were wanted elsewhere. As Arnold Nesselrath's Chapter Nine makes clear, the prized porphyry shafts on the aedicules of the piers have been robbed and replaced with columns of either paler reddish *rosso antico* or gray granite, the latter representing a rupture with the intended color scheme. Similarly, revetment made of serpentine, also known as green porphyry, was substituted with the more common but less intense *verde antico*. The most radical modifications occurred on the attic level of the interior. Here, the alternating panels framed by ornamental moldings and pediments over window-like recesses can be firmly dated to 1753, when the ancient composition was heavily altered. The original scheme, which appears in the sketches of early modern antiquarians and in Giovanni Paolo Pannini's views, as well as a small section of the present attic reconstructed in the 1930s, consisted of little pilasters (or "pilastrini") arranged in groups of four to either side of the "windows" above the exedras of the building. The fact that the pilastrini were not aligned in predictable fashion either with the columns below or the ribs of the dome above contributed – like the junction of the portico and rotunda on the exterior – to the theories about successive building campaigns in completing the Pantheon (see Plates II, VIII, and X, as well as Chapters Ten, Eleven, and Twelve). The ancient materials from the attic have been lost, save for some pieces that ended up in museums and antiquarian collections.[29]

Construction and Proportion

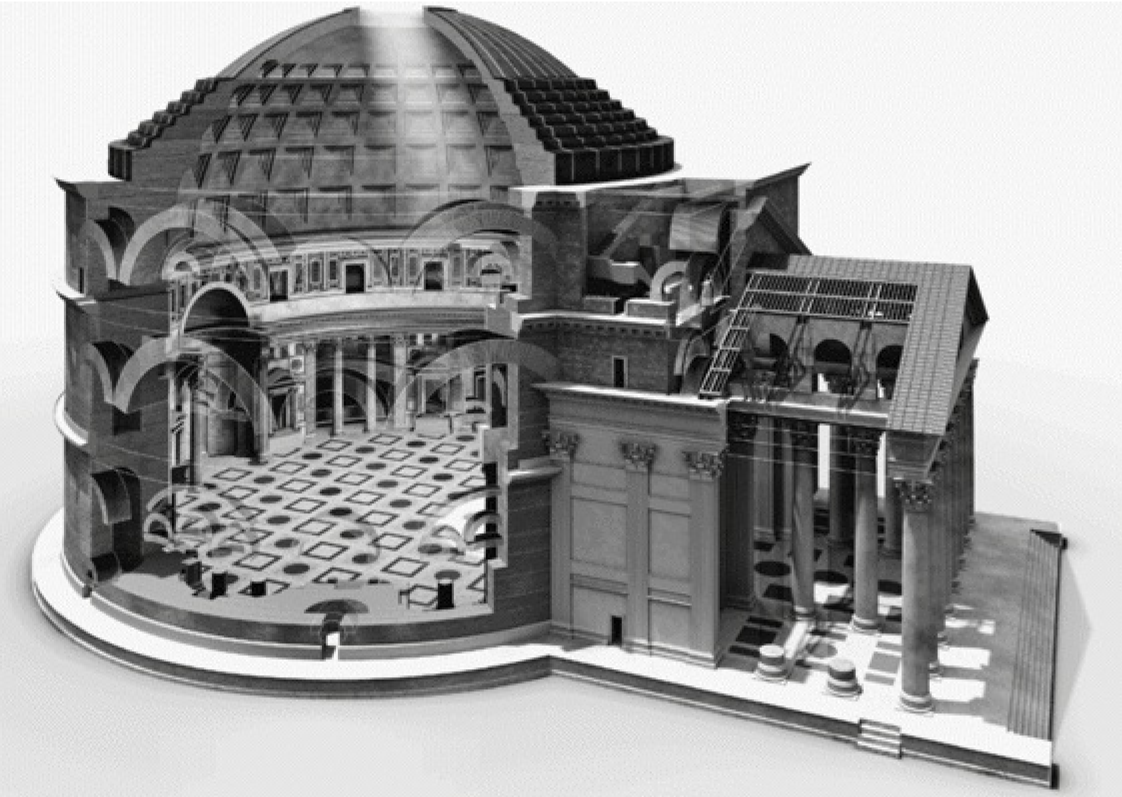
Perhaps nothing about the Pantheon is so much studied and yet so inscrutable as its structure and construction, especially that of the dome. Brick facing was used to contain the concrete, and relieving arches (arches over voids) enabled the thickness of the walls to be honeycombed with cavities that made the structure lighter and hastened the curing of the concrete (see Plate IV). The honeycombing of the rotunda's walls extends into the zone of the springing, where the vault begins to curve inward, and up to the stepped rings at the base of the dome on the exterior. Investigations associated with conservation works have also been able to determine that the aggregate materials used in the concrete of the rotunda and dome are graded into at least six different strata, from the travertine-laden concrete at floor level to a mixture using light volcanic scoria (like pumice but denser) at the top toward the oculus (Fig. 1.12).[30]



1.12. Section showing gradations of heavy-to-light concrete from bottom to top. (Lancaster 2009, Fig. 8)

On the other hand, we cannot assume that the relieving arches extend as solid brick throughout the full thickness of the drum, as frequently shown in modern reconstructions. It seems more likely that in the guts of the structure, bricks are toothed to bond with the concrete (Fig. 1.13; see Chapter Five by Gene Waddell). Similarly, the foundations of the rotunda have yet to be adequately investigated, and so we remain unsure of the extent to which ground settlement might have contributed to some of the vertical cracks that punctuate the structure. The original decoration of the coffering of the dome is likewise a matter of conjecture: Did the coffers contain stellar or floral motifs? Were they elaborated with ornamental moldings? Were they painted or gilded? Was there once a system of stone or stucco

facing the exterior of the rotunda, perhaps incorporating pilasters? The projections of artists and experts from the Renaissance onward may provide plausible answers, but none can be indisputably legitimized by literary, pictorial, or archaeological evidence.



1.13. Cutaway of the Pantheon showing its construction. (Conception Mark Wilson Jones, realization Robert Grover)

One of the most intellectually compelling aspects of the Pantheon is the simple proportional scheme that underlies its form. The interior diameter of the rotunda is equal in dimension to the height of the interior from pavement to oculus, while the cornice marking the division between wall and dome exactly bisects this height (see Plate XII). A hemisphere, therefore, hovers over a cylinder of the same radius and the same height, which means that a sphere can be inscribed in the whole space. Furthermore, if a square is inscribed in the circular plan of the rotunda and is then replicated (or “flipped”) to the north (Fig. 1.5), it will define the limits of the portico. Since the height of the intermediate block is the same dimension as the sides of this square, these parts of the project together compose a cube. Thus, simple relationships govern the volumes of sphere, hemisphere, cylinder, and a cube that can be imposed on the Pantheon in the mind’s eye. These relationships suggest both a generative and a visual function for the measurements employed. In other words, the composition of the building is governed by a coherent set of dimensions, which facilitated its design and execution, as well as contributing to its essential formal aspect. Further analysis reveals how simple ratios, above all 1:1 and 1:2, resonate also in the relationships between various smaller parts of the composition (see Plate X). This, then, is a scheme of elemental beauty and simplicity redolent of Greek mathematics, a connection that Giangiacomo Martines proposes here. Indeed, the fact tha the circle defining the centers of the rotunda columns has a diameter of 150 Roman feet, or 100 cubits, naturally invites speculation on a design method rooted in philosophical intent.[31]

Such correspondences continue to inspire theories to explain both the genesis of the design and its intentions, theories that presume the agency of a thoroughly trained and competent ancient architect.

One of his skills was the ability to construct accurate technical drawings to scale. On the basis of numerous extant examples, such as a marble plan of the Temple of Castor and Pollux near the Circus Flaminius (which includes details like column bases and steps), it is clear that Roman architects used scaled plans and models, a common scale being 1:240, or 1 inch to 20 feet.[32] The architect of the Pantheon may perhaps have used diagrams at this and other scales, such as 1:120 and 1:24, for the purpose of composing plans, elevations, and details. At a later stage in design, relevant information from such drawings, augmented by dimensional and proportional calculations, would have been used to construct full-scale templates, such as the set located near the entrance to the Mausoleum of Augustus, of which some, as mentioned, happen to relate to the Pantheon itself.

The Architect of the Pantheon

Unlike the Parthenon in Athens, Amiens Cathedral, St. Peter's in Rome, Hagia Sophia, or the Taj Mahal, for the Pantheon we have no name for the architect(s) responsible. In the period under scrutiny, however, one name stands out from the prevailing anonymity, the architect-engineer Apollodorus of Damascus. Ancient sources allude to him as Trajan's preferred designer and the author of three major projects in Rome: Trajan's Forum, an unidentified odeon, and a gymnasium that can be presumed to be Trajan's Baths.[33] The attribution of the Pantheon to him cannot be proven, but it makes sense in several ways. He was a master architect-engineer with extensive expertise in constructing timber structures of a kind needed to provide initial support for the concrete dome. Moreover, the marble decoration in the Pantheon shares several stylistic traits with that of Trajan's Forum by Apollodorus, including the handling of the Corinthian capitals and the disposition of the polychrome floor pattern.[34] The open-air half rotundas of Trajan's Baths also offer several points of similarity. The coffering of an exedra presents the closest-known parallel for the coffering of the Pantheon dome (see Fig. 5.7)

It is also significant that the elevations of the exedras of Trajan's Baths present a rhythmic "syncopation" kindred to that of the interior elevation of the Pantheon, where the contrasting treatments of the three main zones (main order, attic, and dome) align only on the axes but not otherwise (see Fig. 5.3). Quite possibly this sophisticated type of treatment was a hallmark of Apollodorus or architects in his circle. Finally, with the inception date of the monument in question once more, the possibility of a Trajanic start gives added strength to the association with Apollodorus, for we know Trajan to have been his appreciative patron and supporter. By contrast, the well-known disagreements between Hadrian and his inherited architect Apollodorus, which according to one tradition proved literally fatal for the latter, would have arisen after Hadrian's accession to power.[35]

The Pantheon in the Middle Ages and the Renaissance

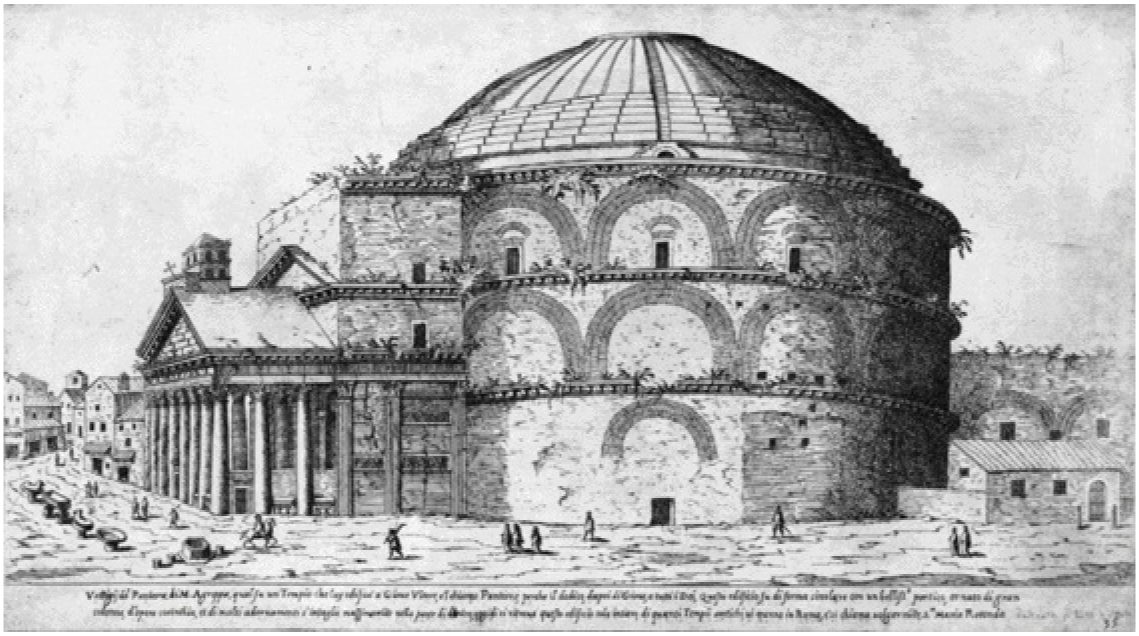
That the Pantheon still stood in impressive condition in late antiquity is well attested in the fourth century BC by the Roman historian Ammianus Marcellinus. It was he who left that felicitous image of the rotunda resembling a city, thus calling attention to the articulation of the interior in a mode that evoked the character of urban facades. Hyperbole may have entered into his writing, yet the Pantheon must have been an extraordinarily captivating building, even by the grandiose standards of Imperial

Rome. This fact more than any other must have inspired Pope Boniface IV to ask the Byzantine emperor Phocas in Constantinople to cede the "temple" to the Church in the early seventh century. Phocas ruled from 602 to 610 and Boniface IV from 608 to 615. The date usually cited for the donation is 609, but a recent analysis suggests that the event took place on May 13, 613, after the death of Phocas (see Chapter Eight by Erik Thunø).[36] This would suggest that the "conversion" of the building should be contextualized in the politics of the Byzantine-dominated papacy in Rome, and not in those of the deceased Byzantine emperor.

Richard Krautheimer dismissed as legend the oft-repeated story that Boniface IV brought 28 cartloads of unnamed martyrs' bones here from the catacombs, as it would have had little to do with contemporary customs.[37] In the mid seventh century we discover the Pantheon being called Sanctae Mariae ad martyres. At the turn of the seventh–eighth centuries, the Venerable Bede likened the dedication of the Pantheon of all the ancient gods to all the martyrs of the Church, although the English monk probably had no firmer basis than tradition for doing so.[38] In the latter half of the eighth century it is referred to as Sanctae Mariae Rotundae.

The twelfth-century Roman guidebook, the *Mirabilia Urbis Romae*, stated that the dedication to Mary supplanted an original dedication to Cybele, the mother of all of the pagan gods. The English pilgrim John Capgrave repeated this story in the early 1450s, recounting how the ancient general Agrippa had seen a vision of Cybele and vowed a church to her and all of the gods if his campaign against the Persians was successful.[39] None of these dedications – not even the Christian function of the building – guaranteed it immunity from depredation. The Byzantine emperor Constans II (AD 641–668) despoiled the dome of its gilded bronze roof tiles, which were ultimately lost. Other changes to the exterior came much later. In 1270, a bell tower was constructed on the peak of the portico's roof, and it remained in place throughout the sixteenth century, as Renaissance drawings attest.

At some unspecified moment in the medieval era, the columns on the east side of the portico were lost or severely damaged. To avoid collapse, a brick wall was erected on a portion of its front and east-facing sides. Most of the wall was eventually removed when the columns were repaired and replaced in the seventeenth century, although remnants of the brick are visible in the uppermost reaches on the east side. The elevated grade of the piazza also restricted access to the porch, reinforcing this separation between the portico and the urban space it once dominated. To descend to the ancient level of the building, three doors and side entrances were established on the perimeter of the colonnade. Their locations are indicated in sixteenth-century engravings, like Etienne Dupérac's, and are also evident from the notches for lintels that were hacked into the porch columns, as may still be seen on site (Fig. 1.14).[40] Like the date of the brick walls, that of these passages is uncertain and may be much earlier than the thirteenth-century bell tower.



1.14. Exterior view of the Pantheon; sixteenth-century engraving by Etienne Duperac. (Avery Library, Columbia University)

The state of the interior during the Middle Ages is also discussed in Chapter Eight. Thunø points out that the much-venerated image of the Madonna and Child, celebrated at the high altar and supposedly painted by St. Luke himself, can be traced no earlier than the eighth century and, thus, well after the dedication of the edifice to St. Mary and all martyrs. The high altar itself was subject tc many changes. In 1270, it was marked by a *ciborium* composed of porphyry columns, and a low stone parapet surmounted by six more porphyry columns surrounded the altar precinct. The surrounding "pergola" must have been an integral part of the altar complex because it was restored by Pope Innocent VIII (1484–1492), who moved it toward the center of the building in order to facilitate access to the relics of the martyrs interred under the altar. These arrangements of 1491 were complemented by a fifteenth-century maiolica relief of the Assumption of the Virgin, which hung within a painted gloria of saints in the half dome of the apse.[41]

In general, the Pantheon received greater respect in the Renaissance than most ancient monuments in Rome, which were often plundered for their building materials and decorative stone. Rodolfo Lanciani catalogued such acts of pillage of ancient architecture in his famous four-volume work, *Storia degli scavi di Roma* (1902–1912; a fifth volume appeared in 2000). The Pantheon did better than escape spoliation for the most part and was occasionally the beneficiary of these campaigns.

Under Popes Martin V (1417–1431), Eugene IV (1431–1447), Nicholas V (1447–1455), Pius I (1458–1464), and Paul II (1464–1471), efforts were devoted to shoring up the masonry of the structure, replacing or repairing the lead tiles of the dome, attending to the roof of the portico, and clearing the market stalls from the portico, the last more notable for its "squalor," according to Flavio Biondo, than its grandeur.[42] A pair of ancient Egyptian lions and a large granite urn are documented on the piazza from the later Middle Ages, and these were maintained by Eugene IV, who took the then-extraordinary step of paving the Piazza della Rotonda. Under Leo X (1513–1521), pedestals were installed under the lions and the urn to raise them above the activity of the square and preserve their integrity. Eugene's intervention was later cited in an ordinance issued by Clement VII (1523–1534) for the maintenance of the piazza. At the beginning of the sixteenth century, their predecessor,

Julius II (1503–1513), was too busy with the construction of St. Peter's and the Vatican Palace to be interested in the Pantheon. That he left it untouched in the search for building materials for the Vatican is remarkable. Respect for the building is eloquently suggested by Raphael's request to be buried there.

Raphael's tomb in the Pantheon was the realization of a provision in the dying artist's will. Although the will has not survived, a letter by an associate in the same year of his death, 1520, indicates that he left ample funds for the construction of a tomb, an altar, and their maintenance. In May of 1523, the Venetian ambassador Marino Sanudo wrote that the altar at the tomb "is being worked on as we speak, of serpentine, porphyry, and marble, and it will be very beautiful." Giorgio Vasari recorded the program as follows: "He [Raphael] then ordered that they should restore one of the ancient tabernacles in Santa Maria Rotonda at his expense, using new stones, and that an altar be created with a statue of Our Lady in marble; this was erected after his death for his sepulchre and place of repose." The statue of the Madonna and Child, executed by Raphael's pupil and collaborator Lorenzetto, reflected the dedication of the church, and his treatment of the Madonna as an ancient matron referred to the heritage of the site.[43]

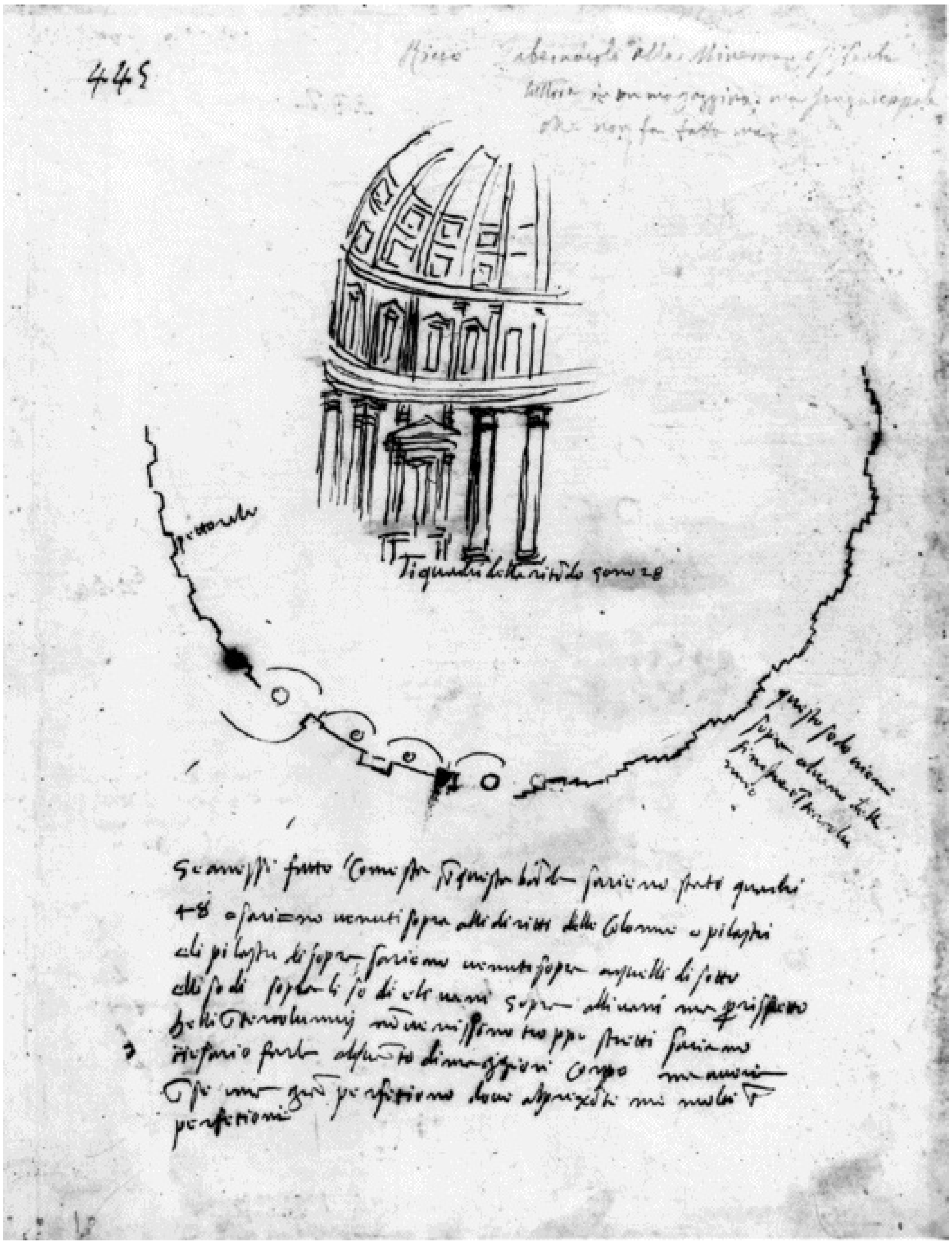
As Nesselrath points out, there is good evidence of earlier burials in the Pantheon, for which medieval and early Renaissance tomb slabs are still preserved, having been removed from the floor during restorations. Nevertheless, Raphael's tomb established a conspicuous precedent for Renaissance artists that was much emulated. After the burial of Raphael's consort, Maria Bibiena, came that of Baldassare Peruzzi, according to Vasari, near Raphael's tomb where "all the painters, sculptors, and architects of Rome" were interred. (The inscribed tablet honoring Peruzzi in the Pantheon today was placed there by his proud Sienese compatriots in 1921.) Under Paul III (1534–1549) in 1545, it became the prerogative of the Pantheon-based Confraternity of St. Joseph of the Holy Land, whose members were composed exclusively of artists, to grant the privilege of burial in the Pantheon. Thus, in the ensuing years it became the final resting place of Perino del Vaga (1547), Taddeo Zuccaro (1566), Giacomo Vignola (1573), and others. The importance of Raphael's tomb is that it linked the notion of burial, traceable back to the Christianization of the monument, to the outstanding artists of Rome. Beyond that, Raphael may have given impetus to the restoration or renewal of the damaged and despoiled niches in the great piers of the rotunda.

From the period of the Renaissance onward, architects and antiquarians left innumerable studies of the fabric in drawings and engravings. Representations from the Renaissance can be separated into two general groups: those images that attempted to record the monument as it stood and those that tried to "improve" or complete features of the building that were lost, damaged, or incomprehensible. In fact, the reception of the Pantheon down to the twenty-first century has paradoxically oscillated between praise of its merits and sympathetic analysis or criticism of features deemed unworthy of the original architect or architects, and therefore not authentic to its origins.[44] Today, by contrast, we interpret the chronology of the building, apparent discontinuities in the fabric, and elements of design on the basis of evidence and understanding that were not available in the early modern period.

Those who attempted to critique the composition and improve it in their drawings famously include Francesco di Giorgio Martini (1439–1502) and Antonio da Sangallo the Younger (1484–1546). Francesco di Giorgio left no detailed textual commentary pertaining to the drawing, in which he increased the height of the interior by inserting an additional attic register, modified the number and rhythm of the pilasters belonging to the existing attic, and rearranged the coffering of the dome

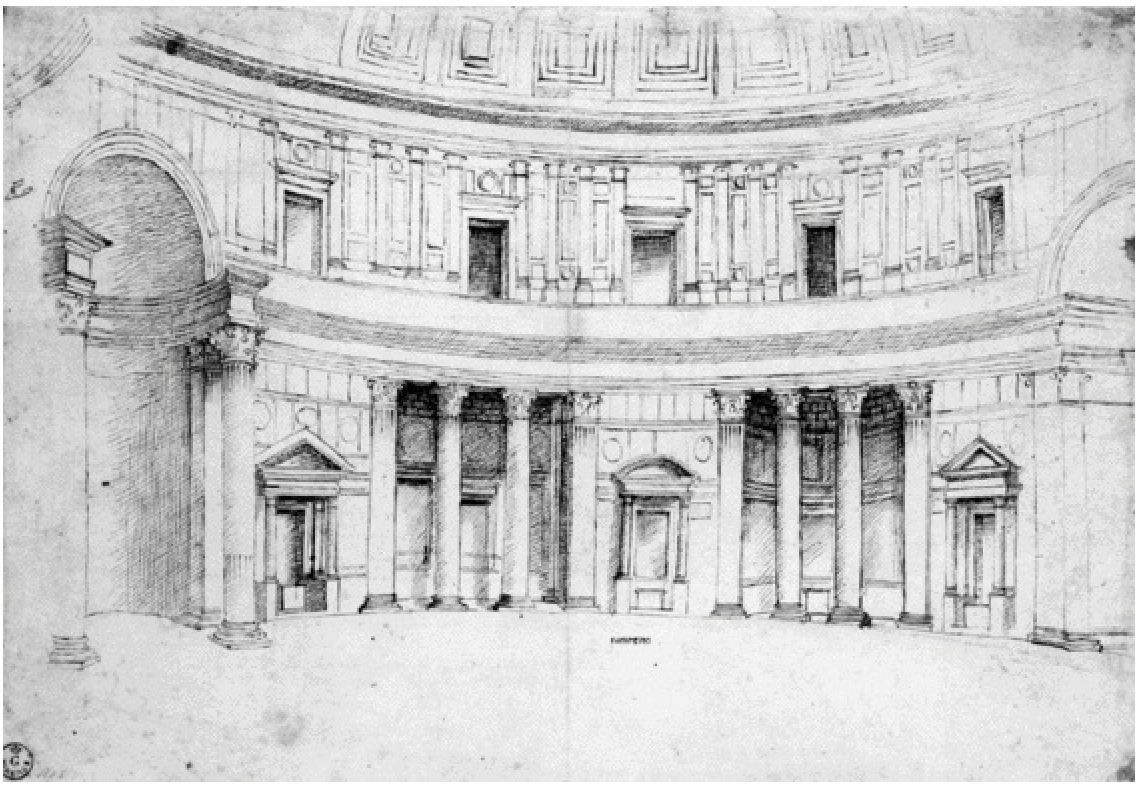
(see Fig. 10.4). These alterations served one purpose: to bring vertical elements of the elevation in line with one another. Thus, Francesco imaginatively redeemed the monument from violating a crucial tenet of Renaissance composition in which solid-above-solid and void-above-void was the rule.

Around 1535 Antonio da Sangallo the Younger addressed this issue (and several others) in drawings and written commentary (Fig. 1.15). He "corrected" the lack of vertical congruity between the columns and pilasters of the main order and the small pilasters of the attic, aligning them with the ribs of the dome to rectify "a most pernicious thing" about the original composition. In other drawings, he changed the position and number of columns in the porch because of a supposedly "erroneous" relationship to the niches and surrounded the temple with columns, producing, as Nesselrath puts it, something of a "caricature" of the original.



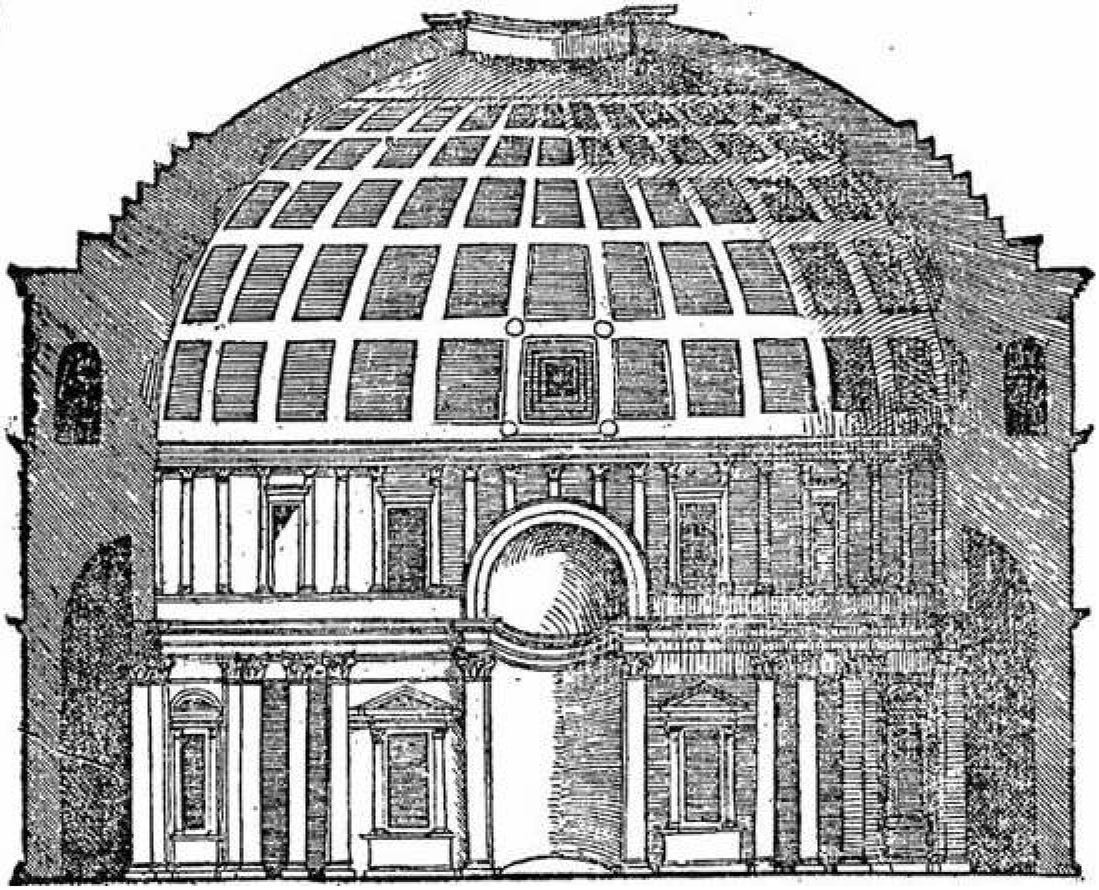
1.15. Proposed refashioning of the Pantheon elevation; sixteenth-century drawing by Antonio da Sangallo the Younger. (Uffizi A 874 recto)

By contrast, Raphael's drawings seem almost reverent in their fidelity, although they too present significant challenges of interpretation (Fig. 1.16). Why, for example, has one of the three exedras (or alcoves) been omitted in his rendering of the view embracing the entrance and altar bays? Perhaps, as Nesselrath proposes, Raphael was responding to impediments at the site, such as the medieval high altar that was refashioned in the 1490s. Nothing of the sort prevented Sebastiano Serlio from issuing his book with woodcuts showing the attic pilasters neatly aligned over the columns and pilasters below them, in evident contrast to the realities on site (Fig. 1.17, a and b). (He also represented the exterior facade without the second pediment over the roof of the portico, another conscious "improvement" of the building he wished to record for posterity.)[45] By contrast, Andrea Palladio returned to Raphael's paradigm in showing the elevation just as it stood (Fig. 1.18, a and b). Something about this layering of the composition must have suggested authenticity to him, an authenticity that escaped others of the period. Certainly Palladio showed no reticence in supplying the exterior with a network of channeled masonry and pilaster orders for which there was no evidence in the monument.[46]

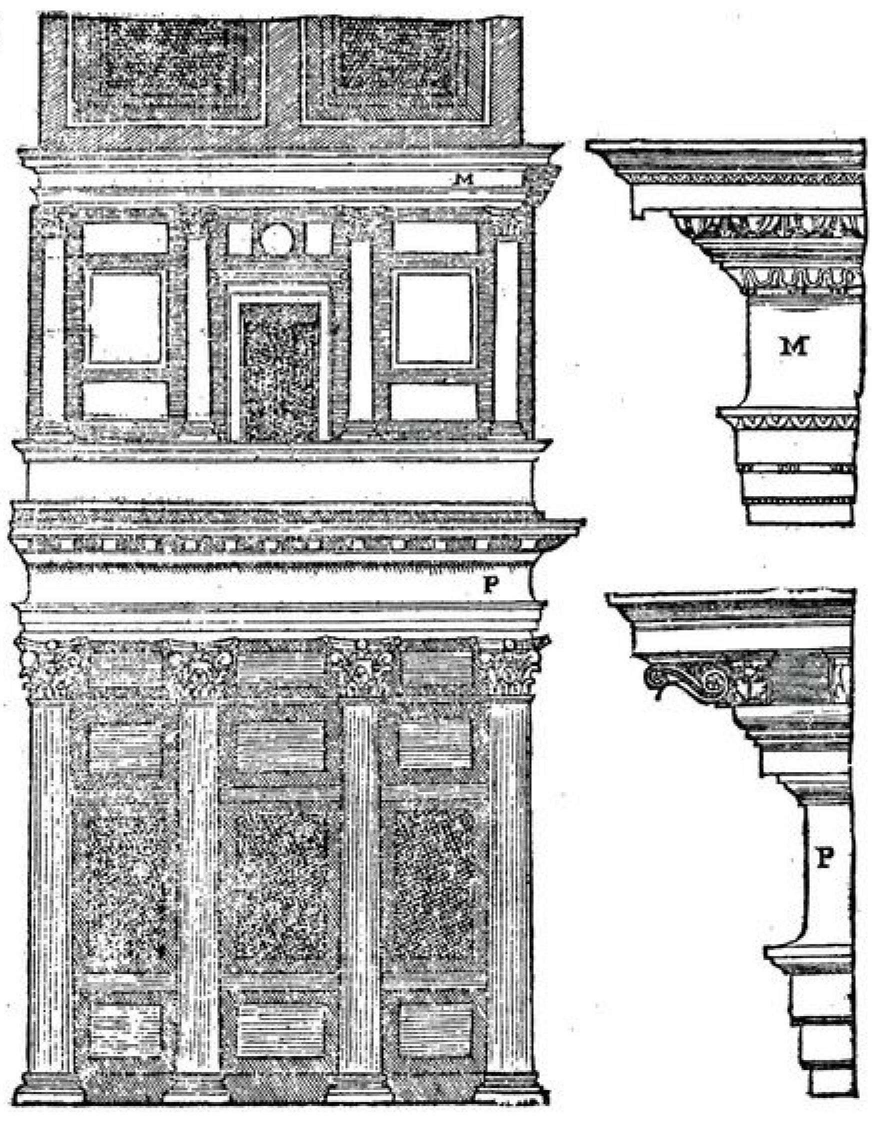


1.16. Interior view of Pantheon; sixteenth-century drawing by Raphael. (Uffizi A 164 recto)

(a)

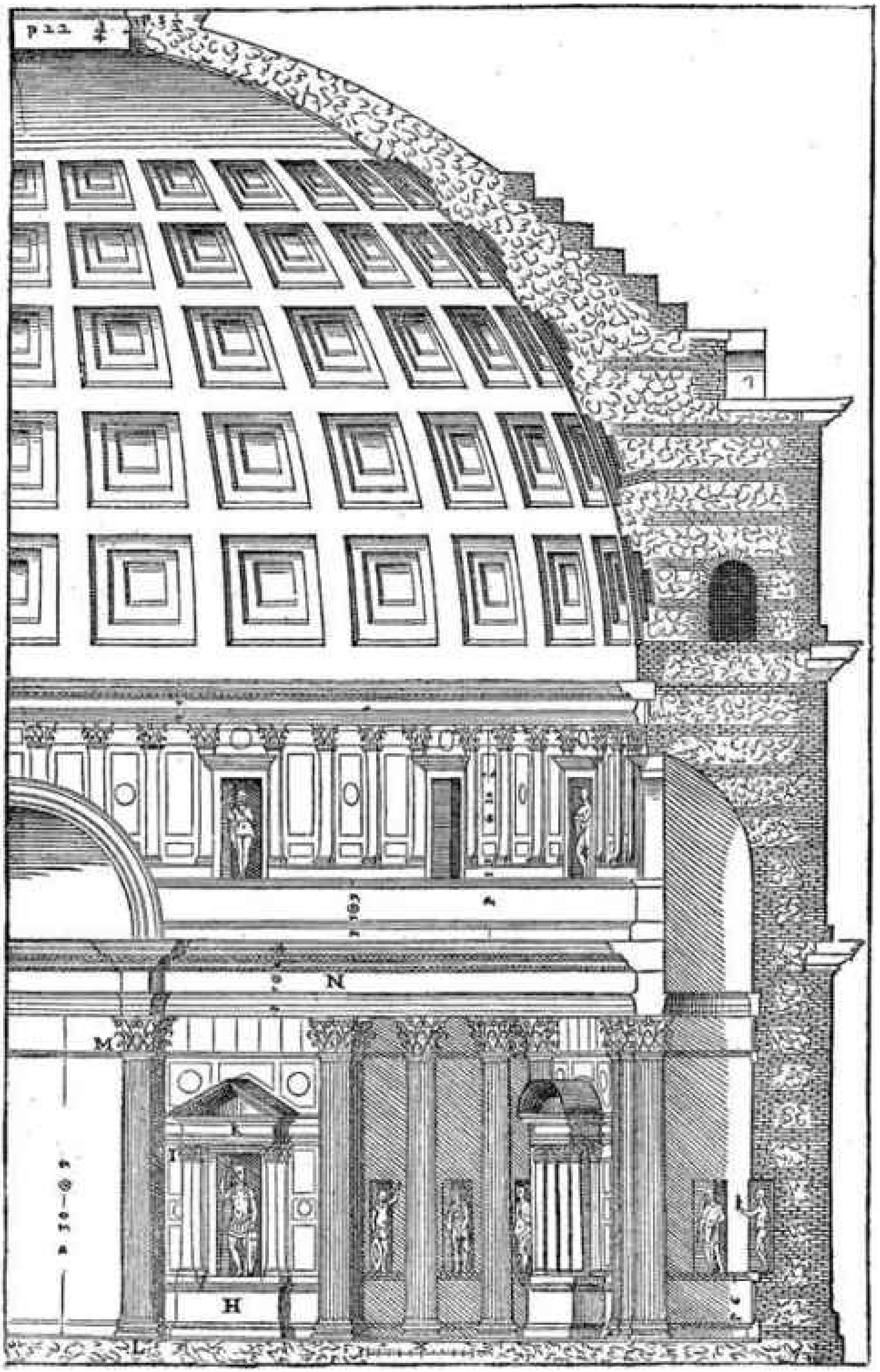


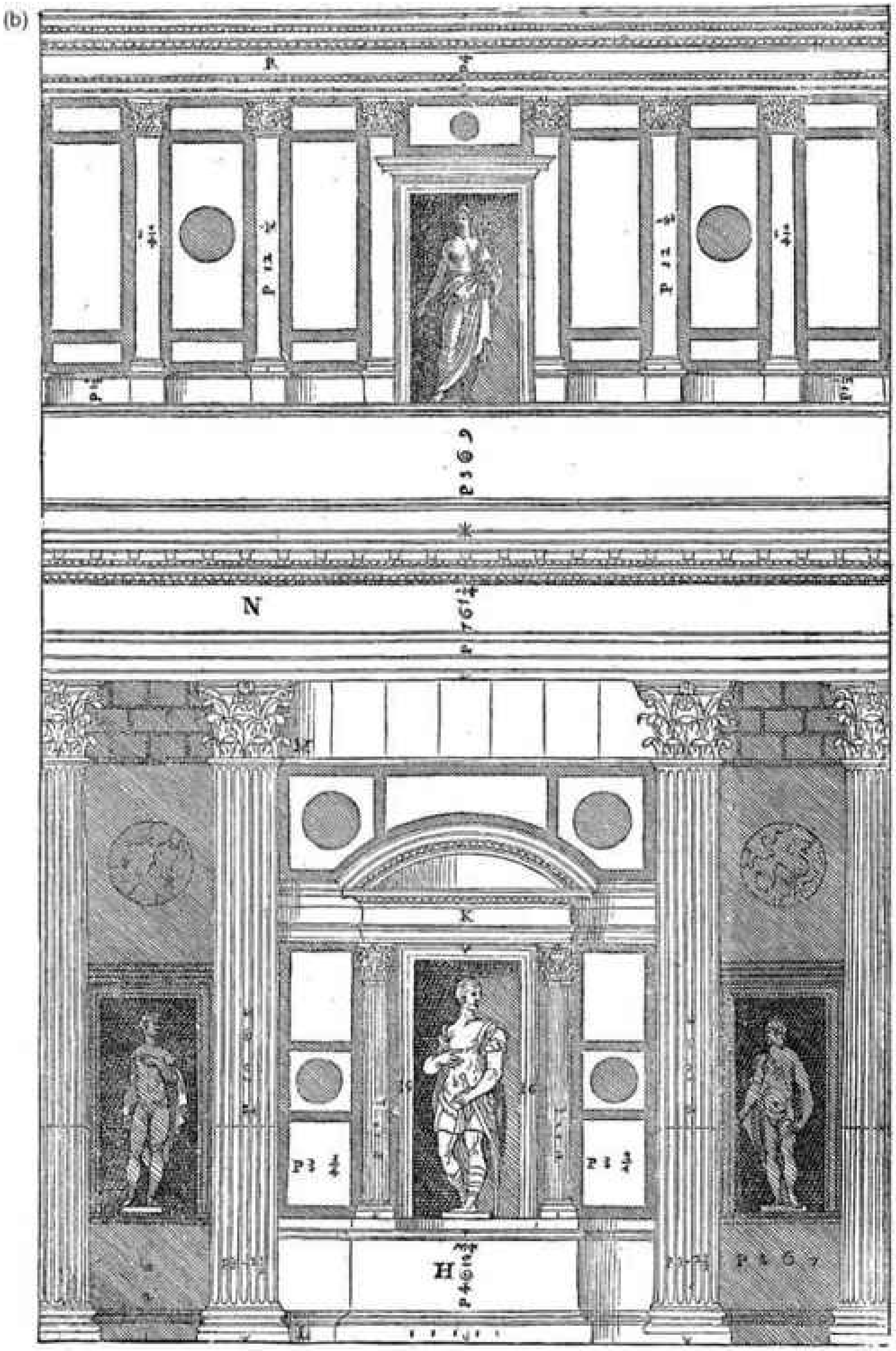
(b)



1.17 a and b. Section and detail of interior elevation; sixteenth-century woodcut engravings by Sebastiano Serlio. (Serlio 1584)

(a)





1.18 a and b. Section and detail of interior elevation; sixteenth-century woodcut engravings by Andrea Palladio. (Palladio 1570)

The lack of vertical congruity of interior components induced Michelangelo to suppose that the rotunda had been built up to the main cornice by one architect; another was responsible for the attic, its windows, and the dome; and a third ancient architect had added the portico.[47] In all likelihood, he was not the first to reach this conclusion, and it certainly did not dull his enthusiasm forthe Pantheon. He judged the windows of the attic to be "most graceful," the portico was a *cosa rarissima* ("a most rare thing"), and from the pavement to the cornicione a *disegno angelico, e non umano* (an "angelic, and not human design"), as we have already mentioned. In the Baroque era, Bernini concurred with

these judgments but, stepping beyond his predecessors, also recognized how the pilasters of the attic story formed a contrapuntal or syncopated rhythm in diminished proportion to the vertical elements rising from the pavement.[48] Thus, the wider and narrower bays that compose the cadence of the main order rising from the pavement were repeated on a smaller scale in the attic. In this reading, Bernini reenvisioned the integrity of the composition through the commensurability of its horizontal rhythms, in opposition to privileging the strict code of vertical alignment. (See Fig. 10.6 and Chapter Ten.)

Today we can also appreciate how the elevation repeatedly severs vertical connections and encourages the perception of an attic floating over the main order and, in turn, the dome floating over the attic. At the same time, there are deliberate alignments that arise like major beats in a musical composition on the main axes and to a lesser degree on the diagonals. In fact, the checkerboard design of the floor, the main order with its exedras and piers, and the attic and coffered dome all participate in a kind of rhythmical swelling and contracting, pushing and pulling.[49] The result is a more dynamic experience than the static formulas so often deployed in Renaissance and Neoclassical interpretations of the rotunda theme.

The Pantheon in the Seventeenth and Eighteenth Centuries

Only partly inherited from the Renaissance, Bernini's high regard for the composition of the Pantheon had no doubt been sharpened by the widespread and hostile reaction to the removal of the ancient bronze trusses from the portico under Urban VIII in 1625. The impetus for this act of official vandalism was the need for metal to cast cannon for the protection of Castel Sant'Angelo, but the negative response was apparently so overwhelming that the pope subsequently claimed to need the materials for Bernini's Baldacchino in St. Peter's. In recent publications, Louise Rice has revisited and exposed this maneuver, which had given rise to the already cited pasquinade "What the barbarians didn't do, the Barberini did." The use of the bronze for a liturgical ensemble was evidently more acceptable than for cannon, although in truth, none of the metal was used at St. Peter's. Instead, the metal from a number of cannon at Castel Sant'Angelo can be traced to the Pantheon bronze beams, the very antiquities that had so often been admired by draftsmen and antiquarians in the previous century.[50]

In apparent compensation for this "barbarous" pillaging of the ancient monument, Urban VIII made reparations to its fabric. He replaced the missing column on the northeast corner of the portico and had the Barberini bee carved on its capital for all to see (Fig. 1.19). He replaced the bronze trusses with the structure of timber rafters, collars, purlins, struts, and braces apparently implemented by Francesco Borromini, whose working drawings are preserved in the Albertina Museum in Vienna (see Fig. 10.1). The thirteenth-century bell tower had to be dismantled to remove the trusses, and to replace it Urban VIII commissioned a pair of twin towers on the flanks of the facade where they could be better supported than at the peak of the portico (Fig 1.20). The towers were designed under the auspices of the papal architect, Carlo Maderno, again with the aid of Borromini, as is also recorded in drawings now at the Albertina Museum (see Fig. 10.2).

1.19. Northeast capital of portico with detail of Barberini bee and, on cornice, the later Chigi stars and mounts. (Photo William Rutledge)

1.20. View of Piazza della Rotonda after removal of vendors, repair of the portico, and rebuilding of the Chapter house; engraving by G. B. Falda, ca. 1665. (Giovanni Battista Falda, *Vedute delle fabriche, piazza, e strade fatte fare nuovomente in Rome dalla Santità di N.S. Alessandro VII*, Rome 1665, unpaginated)

These operations were published decades ago.[51] Nevertheless, the bell towers are still often and incorrectly referred to in the literature as Bernini's "asses' ears," even though Bernini had nothing to do with them or the operations leading up to their construction. When he later drew the Pantheon, Bernini never included the towers, which were finally taken down only in 1892 in the effort to restore the facade to its original, ancient aspect. Ironically, the towers are almost never correctly attributed to

his rivals Maderno and Borromini.

The next major campaigns on the Pantheon took place in the 1660s, during the reign of Alexander VII, a great builder and an enthusiastic antiquarian, who sought to restore the glories of the ancients to the modern city of Rome. It was he, for example, who hired Bernini to remodel Piazza San Pietro. Not surprisingly, Alexander also aspired to restore the original dimensions of Piazza della Rotonda in front of the Pantheon. Portions of the ancient *platea* had been discovered in Urban VIII's time during excavations for the foundations of the church of Santa Maria Maddalena. Alexander knew this and aspired to purchase and demolish the city block between Piazza della Maddalena and Piazza della Rotonda, to grade the piazza to its ancient level, and to regularize its boundaries. In the event, however, financial and practical realities overtook these ambitions. Regularizing the Piazza della Rotonda proved to be as difficult as freeing the Pantheon of the buildings built against it. Even ridding the piazza of vendors proved exhausting and ultimately insurmountable.[52] In the end, he did grade the piazza modestly, situated the vendors behind the fountain, and replaced the last two missing columns and the entablature (decorated with his Chigi family arms) on the east side of the portico. He had the old brick wall on the east side of the portico demolished and the columns freed of attached buildings. But he then had to rebuild the Chapter house of the canons of Santa Maria della Rotonda on the east flank of the rotunda well behind the newly restored columns (Fig. 1.20).

Financial constraints and compromise with entrenched forces also limited Alexander's work on the interior of the Pantheon. Three times he was said to have asked Bernini to decorate the venerable interior, and three times his favorite artist and confidante refused. Part of the work requested by the pope pertained to the attic; other parts involved decorations for the coffers of the dome. Drawings from circa 1662 to 1667 indicate that the pope wanted to decorate the coffers with his family emblems (six mounts, six-pointed stars, entwined laurel; see Fig.10.8). Some of the stuccoes were installed, as we know from reports of their removal under the following pontificate, while some bits apparently survived until Pannini's day (see Chapter Eleven). Other proposals, like the inscription dedicated to the pope that was to be installed around the oculus in a field of stars, remained unexecuted (see Fig. 10.8).[53] A degree of egomania seems to have inflected these projects, but fortunately, tradition prevailed and little of consequence was done to the Pantheon for the balance of the century.

At the beginning of the eighteenth century, Clement XI (1700–1721) sponsored a redesign of the whole altar area. The new altar, the work of Alessandro Specchi (1668–1729) was probably inspired by a report of 1714 on the history of the only two saints known by name – Anastasius and Rasius – from among the 28 martyrs reportedly brought to the Pantheon in the seventh century. (During routine repairs in anticipation of the Holy Year 1675, their remains had been discovered behind an iron grating at the back of the altar.) Thus, in 1715, a scheme was developed to refashion the high altar, which included a large tabernacle that may have utilized the older porphyry columns on site. On the altar mensa, Specchi planned a sculpture of the Madonna and Child, which would have obscured a view of the medieval miracle-working Madonna image, the Renaissance maiolica Assumption relief, and older frescoes on the walls of the apse. In any event, the scheme was significantly changed and finally unveiled in 1725, during the pontificate of Benedict XIII (1724–1730).[54]

This work obliterated the frescoes of Saints Anastasius and Rasius (date uncertain) located on the right wall of the tribune. Henceforth, the saints were commemorated in the pier niches flanking the apse with over-life-sized statues by the artists Bernardino Cametti (1669–1736) and Francesco

Moderati (ca. 1680–1729). Contracts for these marble figures in 1725 and 1727 tell us that St. Rasius by Moderati was located to the left of the high altar and St. Anastasius by Cametti to the right, where they are seen today (Fig. 1.10). On the other hand, Specchi's high altar was completely dismantled and rebuilt in 1934 during the Fascist era. At that time, nearly all vestiges of the medieval, Renaissance, and eighteenth-century elaborations of the altar and the apse disappeared. The gilded coffering pattern in the apse and the Albani emblems (three mounts and stars) on the projecting entablatures flanking it are the only notable remains of Specchi's work.[55]

For the Pantheon, Specchi also produced an unexecuted project circa 1710 to remodel the Chapel of St. Joseph of the Holy Land (San Giuseppe di Terra Santa), which is the second chapel at the left on entering (see Fig 11.4). The confraternity of St. Joseph of the Holy Land was established in 1542 by a canon of Santa Maria ad martyres named Desiderio di Adiutorio (1481–1546) and approved the following year.[56] Membership in the confraternity soon became exclusive to artists of the day and came to be called "I Virtuosi al Pantheon." Desiderio had been to the Holy Land twice and wanted to exhibit his collection of relics at the Pantheon, ultimately hoping to be buried there too, following Raphael's precedent. In 1545, the confraternity was granted the right to extend permission for burial there to deserving members of the group.[57] Before this time, there was no consistent tradition for burial in the Pantheon apart from its consecration to all of the martyrs of early Christianity and the few tomb slabs we have mentioned in passing.

In 1713, the privilege of visual artists to burial at the Pantheon was expanded to include the composer Angelo Corelli. This event corresponded to the decision to locate commemorative niches and busts around the entire circumference of the building, as Pannini's paintings show (Plate II). Many of the niches remained empty throughout much of the eighteenth century. Then, around 1780, an effort was made to provide busts for Nicholas Poussin, Anton Raphael Mengs, and J. J. Winckelmann, thus an older artist and two who were recently deceased. In turn, these inspired the sculptor Antonio Canova (1757–1822) to propose the installation of a new series of commemorative busts of the "illustrious and most important men in Italy." The first of them were Dante, Tasso, Michelangelo, Palladio, Correggio, Titian, and Veronese; others followed, all commissioned by Canova at his expense from fellow sculptors. At the time, 1809, Canova occupied essential offices for Pope Pius VII (1800–1823), and then, after the Napoleonic invasion of Italy and occupation of Rome in later 1809, for the French. In fact, the French prefect of Rome, Camille de Tournon encouraged Canova's idea, perhaps inspired by Ste-Geneviève in Paris. Canova had been to Paris in 1802, less than a decade after the church had become the Panthéon and turned into a national mausoleum.[58] Thus, the Roman Pantheon inspired a French Panthéon, which in turn affected thoughts about the use of the original building.

After 1814, the expulsion of the French from Rome, and the reestablishment of papal governance, a number of observers, including the reigning pope, Pius VII, realized that Santa Maria ad martyres was now celebrating heroes of a secular world.[59] Susanna Pasquali describes how, in a midnight raid in 1820, all of the busts in the Pantheon were removed to a new collection at the Vatican Museums, with papal officials eventually reinstating only those monuments directly relevant to church history. By 1833, doubts even arose about the true location of Raphael's remains, giving occasion for a dramatic exhumation by candlelight.[60] It revealed that Raphael was indeed buried at the site, a notion that still reverberates among today's visitors.

In aesthetic matters, the Pantheon has often been a magnet for contemporary opinion. When inadequately anchored bits of the dome began falling in 1753, a massive and controversial "restoration" was undertaken. This episode – again fully documented by Pasquali and thus not datable to 1747 as often claimed – is one of the richest testaments to the reception of the building.[61] The consolidation effort was directed by Antonio Baldani, a papal official, noted scholar, and proponent of neoclassical aesthetics. Included in his charge was the repair of the attic, where much of the placage had become dangerously detached and in need of refurbishing. Rather than doing so, however, he had the attic stripped of the marble pilasters and other decorations that had inspired so much Renaissance debate. In spite of Bernini's admiration, Baldani was convinced that the composition of the attic must have been due to alterations imposed on the ancient building after its Christian consecration. We have already encountered the reason: the attic register simply did not follow the received view of classical rules of design dictating the placement of solid above solid and void above void.

Although informed scholars opposed him – Giovanni Gaetano Bottari, for example, maintained that the building had been rededicated to Christianity "without moving a stone" – Baldani hired the young architect Paolo Posi (1708–1776) to replace the composition. The original pilastrini disappeared forever. The new scheme remains in the building for all visitors to see: a remarkably dull combination of rectangular fields and pedimented window frames (see Plate VIII). There is, of course, no antique precedent for Posi's composition, and critics were quick to react. In 1756, the polymath, essayist, critic, and collector Francesco Algarotti (1712–1764) described how "they have dared to ruin that magnificently august fabric of the Pantheon, which alone among the works of antiquity remained complete." Writing from Venice in 1777, the artist and critic Antonio Visentini (1688–1782) called it a disaster that should never have occurred. The historian Francesco Milizia (1725–1798), noted for his bias against the baroque, was a little charitable at first, characterizing Posi's "talento grande, senza buona architettura" but later accused him of "the new fashion of thumbing one's nose at antiquity."[62]

The Pantheon from the Nineteenth Century to Our Day

If Baldani and Posi had anticipated future praise for their resolution of a historic feature of the Pantheon, they were sadly mistaken. In 1807, Carlo Fea termed the remodeling of the attic "an unpardonable barbarism" and called Posi "nefarious, reckless, and arrogant." Giovanni Eroli, writing in 1895, termed the scheme "bestial." From the Fascist period, Alberto Terenzio's judgment may seem comparatively mild, merely calling the work "deplorable." It was during Benito Mussolini's rule that Terenzio was commissioned to return the Pantheon as much as possible to its ancient state, and for this purpose in 1929–1934 he restored a small section of the attic to the right (west) of the main exedra with the pilastrini that Posi had obliterated (see Plate VII).[63] Because it is such a small portion of the attic circumference, it looks somewhat lost – a gesture too tentative to allow the eye easily to sense the virtues of the original.

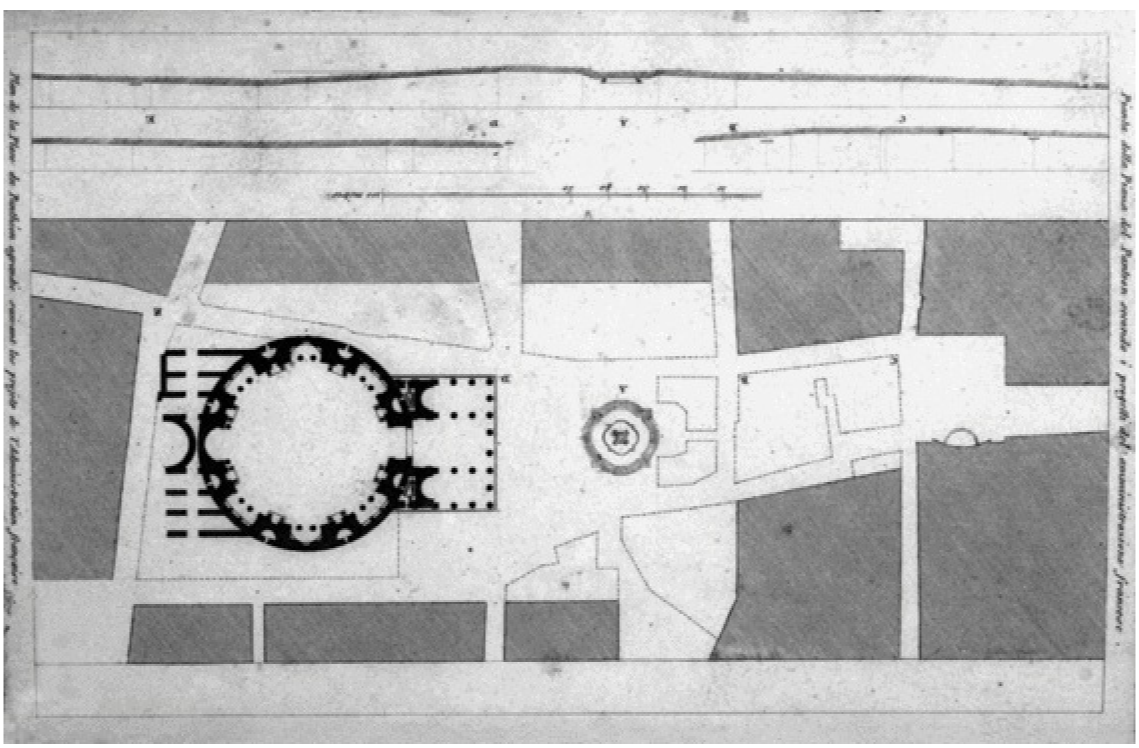
VII. Portion of attic register of Pantheon interior that was restored to original design by Alberto Terenzio in the 1930s. (The Bern Digital Pantheon Project)

VIII. Attic register of Pantheon interior as renovated beginning in 1753 by Paolo Posi. (The Bern Digital Pantheon Project)

Nearly every administration in charge of the Pantheon over the centuries sought to liberate the structure from the accretion of buildings around it and to limit the activity of vendors. Alexander VII's

success in confining the market stalls behind the fountain must have encouraged Clement XI to embellish the Fontana del Pantheon in 1710–1711. By adding an ancient obelisk on a rocky base in the center, Filippo Barigioni (1690–1753) gave emphasis to Giacomo della Porta's preexisting basin and spouts of circa 1575 (Fig. 1.1). The inspiration was surely Bernini's Fountain of the Four Rivers on nearby Piazza Navona, which sits in front of Sant'Agnese, a centralized, two-towered church like the Pantheon. Barigioni's additions succeeded in pulling the fountain into a much more forceful relationship with the Pantheon, even if the axes are not precisely aligned (see Figs. 10.10 and 10.12).[64]

The presence of the vendors, merchants, and markets on the piazza persisted into the early nineteenth century when, under the Napoleonic regime of Prefect Camille De Tournon, the problem was once again addressed. Between 1809 and 1813, orders were issued "in the name of Napoleon" to remove the new accretion of stalls and booths "which detract the admiration of visitors from a part of the most beautiful monument of antiquity."[65] The famous neoclassical architects Raffaele Stern (1774–1820) and Giuseppe Valadier (1762–1839) were commissioned to identify, evaluate, and demolish houses attached to the flanks of the Pantheon and to fix the space in front of it as a "piazza rettangolare." The fishmongers were to be transferred to a new location near Sant'Eustachio. In 1813 it was proposed to tear down the Pantheon's bell towers, but this did not happen. A plan approved by De Tournon's commission also projected the extension of Piazza della Rotonda to Piazza Maddalena, almost exactly as had Alexander VII (Fig. 1.21).[66] This plan, was published in the atlas of De Tournon's schemes for revitalizing the historic centers of Rome.[67] In a different political climate after Napoleon's demise, Popes Pius VII (1800–1823) and Pius IX (1948–1978) took up identical campaigns, again without success.[68]



1.21. Scheme for enlarging Piazza della Rotonda during the Napoleonic occupation of Rome under Camille De Tournon. (De Tournon 1855, Plate 30)

Since the unification of Italy and the designation of Rome as its capital in 1860–1861, the Pantheon had been the target of many restorations and ephemeral embellishments. In the first Master Plan of

Rome in 1873, the complete liberation of the building from all structures attached to it was foreseen, as was the extension of Piazza della Rotonda. The second Master Plan of Rome of 1883 dropped the idea of extending the piazza but maintained the desire, eventually fulfilled, to expose all of the ancient parts of the south side of the monument. Ironically, as Allan Ceen has argued, such isolation was not desired by the ancient architects, nor in all probability anticipated. This vision was, rather, an invention of the Renaissance and the seventeenth century, which was nurtured to fruition in the nineteenth and twentieth centuries.[69]

The twin campanili built on the facade by Maderno and Borromini were removed in 1882–1883 (Figs. 1.22 and 1.23). The context for this demolition was highly politicized and not merely an attempt to return the prospect of the Pantheon to its ancient state. Because the towers had assumed the role of marking a church, their removal signaled a return to its pre-Christian origins, a change not welcomed by the Vatican (see Chapter Twelve). It was indeed a baldly anticlerical gesture. This was followed by a host of other restorations of a less conspicuous nature, which took place with such frequency in the late nineteenth and early twentieth centuries that a complete list defies our limits of space and patience. Yet each is important in identifying what is and is not truly ancient in the fabric today. For example, the pavement of the rotunda was restored in 1872 and many times thereafter, right up to the 1990s as mentioned earlier. Large areas of brick pavement in the portico were replaced in white marble and granite in the period 1883–1885. In 1911, Antonio Muñoz restructured Raphael's tomb and altar.[70]

1.22. Facade of Pantheon before 1882–1883; period photograph. (Photo archive, National Gallery of Art, Washington, D.C.)

1.23. Facade of Pantheon after removal of bell towers in 1882–1883; period photograph. (Photo archive, National Gallery of Art, Washington, D.C.)

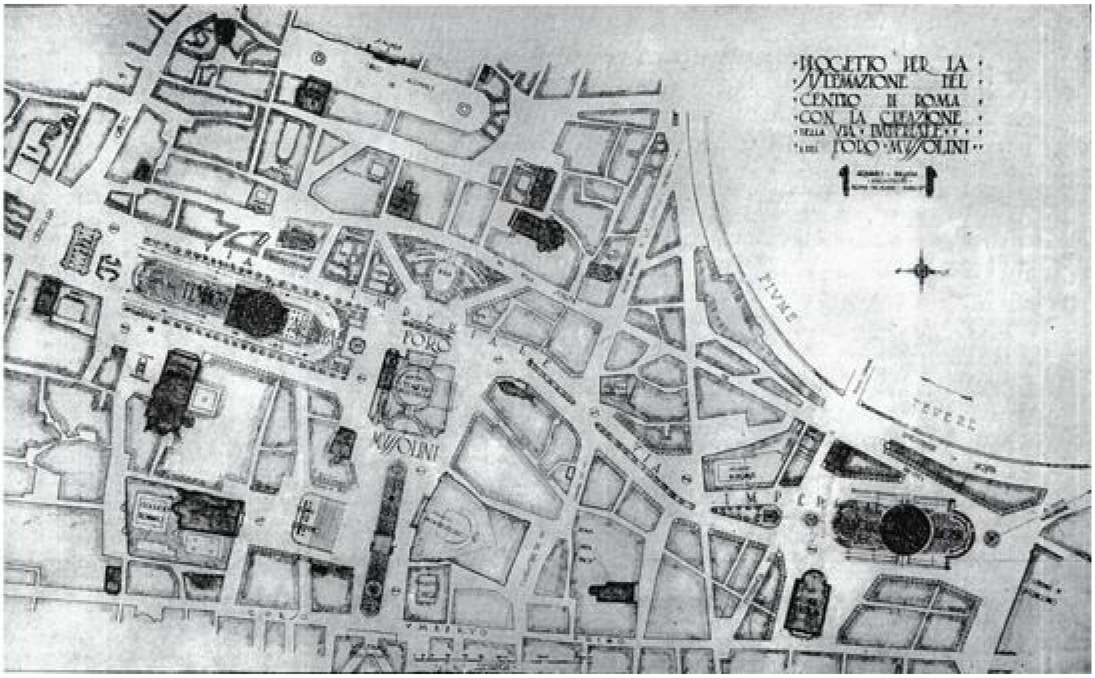
By the early 1890s, both Dressel and Chédanne had come to realize that bricks from the Pantheon bore evidence of Hadrian's reign. An excavation directed by Luca Beltrami, assisted by the young Pier Olinto Armanini in the years 1892–1893, added fuel to the debate. Robin Williams's chapter explains how, in a bit of unfortunate timing, Chédanne's drawings were exhibited in Rome in 1895, just months after the new minister of public education, Guido Baccelli, had restored the Agrippan inscription on the facade at great expense. Baccelli responded furiously, "Yet I have placed in bronze letters on the frieze of the Pantheon AGRIPPA FECIT; until I shall be with Minerva, vivaddio Hadrian has nothing to do with it!"[71] This reaction deserves to be recalled as we evaluate Hetland's redating of bricks to the Trajanic period in Chapter Three.

The death in 1878 of the first king of a united Italy, Victor Emmanuel II of Savoy, inspired a project drawn up by Pietro Comparini (1833–1882) for a huge "Foro Vittorio Emmanuele" in 1881 (Fig. 1.24). Under the direction of Baccelli, Comparini's project would have restored the piazza to the dimensions anticipated in the earlier projects of Alexander VII and the Napoleonic regime, in the service of yet another politicized vision of antiquity.[72] Yet again, this was not to be. Instead, the definitive design for the well-known monument to Victor Emmanuel was selected for the more conspicuous site on Piazza Venezia in 1882 (see Fig. 12.8 and Plate XXIV). In 1884, Victor Emmanuel's son and successor Umberto I ordered the king's tomb located in the lateral niche on the west side of the Rotunda's interior. Upon Umberto's death in 1900, his own tomb was arranged in the eastern niche of the Pantheon in the years 1904–1911. Under the Lateran Accords of 1929, the Pantheon became the Palatine basilica of the Savoy family, a reprise of dynastic intentions that can be traced back to the days of Augustus and Agrippa.

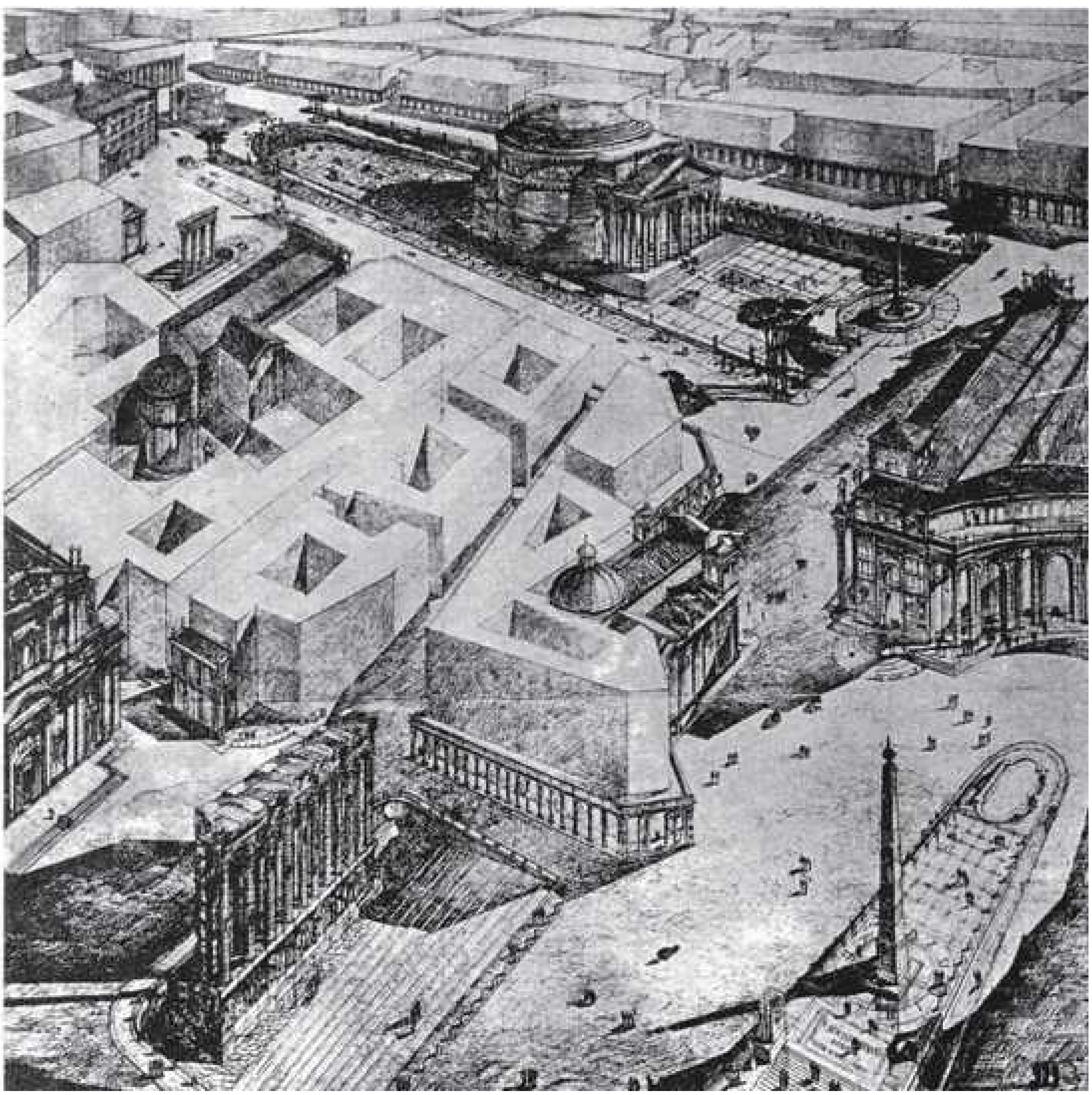
1.24. Scheme by Pietro Comparini for enlarging Piazza della Rotonda to commemorate King Victor Emmanuel II, 1882. (Racheli 2000, p. 356)

We have already referred to the Fascist era restorations between 1929 and 1934 under the aegis of the Sopraintendenza ai monumenti di Lazio and directed by Alberto Terenzio. At this time, much of the exterior brickwork was repaired and repointed, its surfaces hammered to distinguish their texture from the ancient masonry. In the same campaign, the revetments of the interior were consolidated, and the high altar was replaced by a spare modernist counterpart, which must have seemed more appropriate to the imagined severity of the ancient building. In 1928, the niches and altars in the Rotunda were reconstructed to eliminate most vestiges of baroque decoration. For a time, Mussolini or his advisors must have hoped to capitalize on the imperial associations of the Pantheon for their own purposes, as the House of Savoy had done. Armando Brasini (1879–1965) designed a "Foro Mussolini," borrowing heavily from the earlier schemes with which we are familiar. His vision included a forecourt graded to the ancient level and extended around and behind the Pantheon as a vast sunken piazza, which was to be surrounded by famous ancient statues brought to the site from Rome's museums (Fig. 1.25, a and b).[73]

(a)



(b)



1.25. a) Plan for a Foro Mussolini uniting Piazza Colonna and Piazza della Rotonda by Armando Brasini, 1927; and b) bird's-eye view. (Racheli 2000, p. 357)

The problem of integrating the "living Rome" with monumental Rome has long been an issue of debate. In response, the architect and historian Gustavo Giovannoni (1873–1943) advocated the preservation of ancient sites within the context of the evolving urban tissue. In the end, his views prevailed, not perhaps out of universal acceptance but due also to Mussolini's ambivalence toward the power of monumental art and urbanism to support his regime.[74] The Pantheon survived, significantly restored, and another chapter in the history of its "preservation" ended with relatively minimal damage.

In a concluding chapter to this volume, Richard Etlin discusses the various associative values that the Pantheon has embodied in the modern era. As an architectural form to be emulated and almost endlessly quoted, it could serve as a symbol of Christianity, divinity, or religion itself. It could inspire the monumentalization of nature, knowledge, education, rulership, democracy, fame, or patriotism. For some, the Pantheon encapsulates the notion of eternity, for others truth, and others still a perfection that is at once formal and spiritual. Frank Lloyd Wright called his Guggenheim Museum "my Pantheon." For Louis Kahn, the "Pantheon is really a world within a world."

Such ideas represent a beginning, not an end, of broader studies of the fabric that arose sometime in the second century AD. Today we may take comfort from a greater degree of legislative protection and oversight for Rome's architectural heritage and the jewel in its crown that is the Pantheon. The structure of the portico was consolidated in 1954; from the mid-1960s to the early 1970s, the roof tiles were reset and drainage improved; other works of maintenance and cleaning were pursued almost uninterruptedly from the latter half of the 1970s into the 1980s. Some of the most impressive preservation efforts took place beginning in 1992, under the direction of Mario Lolli Ghetti: cleaning, repairing or replacing, and repatinating much of the marble encrustation of the interior.[75] After more than two centuries when just the one leaf of the great bronze doors could be opened, and incompletely at that, we can now enjoy the full generosity of both leaves functioning anew, thanks to conservation works carried out in 1998.[76]

Just as maintenance and conservation continue and will continue, so does research. Aided by countless photographs available on the Internet and laser-scanned surveys of the building, such as those produced by the Karman Center of the University of Bern, new information offers new insights on matters of construction and issues of stability. On the other hand, there is still no extensive published survey of the building that would guide our appreciation for what is original, added, or restored in the fabric. Who knows, for example, what mysteries lie concealed beneath the smooth interior surfaces of the coffered dome as restored in 2004–2005? The situation epitomizes, literally and figuratively, the deeper fascination of the Pantheon. The building is no simple archaeological artifact awaiting forensic dissection but a living monument. Unknowns and apparent contradictions will continue to puzzle, enchant, and defy definition or full comprehension. Our goal in this volume has been to gather new research on the Pantheon, and to present it interwoven into a fabric of considerations, past, present, and future. Inevitably, there is more still to be learned, but as we do so, the lure of the monument and its layered history can only continue to grow.

1 The main scholarly monograph on the Pantheon is Kjeld De FineLicht's *The Rotunda in Rom: A*

Study of Hadrian's Pantheon, Copenhagen 1968, recently joined by Gene Waddell, *Creating the Pantheon: Design, Materials, and Construction*, Rome 2008. For a brief but excellent introduction, see William L. MacDonald, *The Pantheon: Design, Meaning, and Progeny*, London 1976 (repr. 1981, 2002). See also Roberto Vighi, *The Pantheon*, Rome 1964, and F. Lucchini, *Pantheon*, Rome 1996.

2 On the progeny of the Pantheon, see MacDonald 1976, a topic which also recurs in the chapters in the second half of the present volume.

3 Francesco Paolo Fiore and Arnold Nesselrath, *La Roma di Leon Battista Alberti: umanisti, architetti e artisti alla scoperta dell'antico nella città del Quattrocento*, Milan, 2005, p. 191.

4 Allan Ceen, "The Urban Setting of the Pantheon," in Gerd Grasshoff, Michael Heinzelmann, and Markus Wäfler, eds., *The Pantheon in Rome: Contributions to the Conference, Bern, November 9–12, 2006*, Bern 2009, pp. 127–138.

5 Scriptores Historiae Augustae (S.H.A.), *Hadrian*, 19.10. For this and other ancient sources see Licht 1968, pp. 180–184, and for recent defense of the Pantheon as a temple see Fabio Barry, "The Pediment of the Pantheon. Problems and Possibilities," in *Scritti in onore di Lucos Cozza*, ed. Robert Coates-Stephens and Lavinia Cozza, London and Rome 2014, pp. 89–105, esp. 95–98.

6 Paul Godfrey and David Hemsoll, "The Pantheon: Temple or Rotunda?" in *Pagan Gods and Shrines of the Roman Empire*, ed. Martin Henig et. al., Oxford 1986, pp. 195–209. However, the Asklepieion at Pergamon, a religious structure, does repeat the basic form of the Pantheon.

7 Eugenio La Rocca, s.v. "Pantheon (fase pre-Adriana)," in E. M. Steinby, ed., *Lexicon Topographicum Urbis Romae*, Rome 1995–1999; vol. 5, 1999, pp. 280–283.

8 For this connection, see Edmund Thomas, "From the Pantheon of the Gods to the Pantheon of Rome," in Richard Wrigley and Matthew Cracke, eds., *Pantheons: Transformations of a Monumental Idea*, Aldershot, 2004, pp. 11–33. However, Thomas was of the opinion that the Tychaion stood in Antioch in Syria, whereas Alexandria is identified as the site by La Rocca in his chapter here, as confirmed by Judith. S. McKenzie and Andres T. Reyes, "The Alexandrian Tychaion: a Pantheon?" *Journal of Roman Archaeology* 26, 2013, pp. 36–52.

9 Filippo Coarelli, *Il Campo Marzio: dalle origini alla fine della repubblica*, Rome, 1997, pp. 17–59.

10 William C. Loerke, "Georges Chedanne and the Pantheon: A Beaux Arts Contribution to the History of Roman Architecture," *Modulus* 1982, pp. 40–55

11 Heinrich Dressel, *Inscriptiones urbis Romae latinae*, Berlin 1891; Herbert Bloch, *I bolli laterizi e la storia edilizia romana. Contributi all'archeologia e alla storia romana (1936–1938)*, Rome 1947. For further background, see Chapter Three in this volume.

12 Paola Virgili and Paola Battistelli, "Indagini in piazza della Rotonda e sulla fronte del Pantheon," *Bullettino della Commissione Archeologica Comunale di Roma* 100, 1999, pp. 137–154.

13 Licht 1968, pp. 35–58; Mark Wilson Jones, *Principles of Roman Architecture*, New Haven 2000, Chap. 10.

14 The idea came to Lucos Cozza during restoration work in 1954, as reported in Licht 1968, pp. 45–46.

15 Paul Davies, David Hemsoll, and Mark Wilson Jones, "The Pantheon: Triumph of Rome or Triumph of Compromise?" *Art History* 10, 1987, pp. 133–153; Wilson Jones 2000, Chap. 10.

16 Wilson Jones 2000, pp.184 and 208.

17 Lothar Haselberger, "Ein Giebelriss der Vorhalle des Pantheon. Die Werkrisse vor dem Augustusmausoleum," *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung* 101, 1994, pp. 279–308.

18 Licht 1968, pp. 48–58.

19 Licht 1968, pp. 126–132; Doris Gruben and Gottfried Gruben, "Die Türe des Pantheon," *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung* 104, 1997, pp. 3–74; Giovanni Belardi, ed., *Il Pantheon: storia, tecnica, e restauro*, Viterbo 2006, pp. 181–193.

20 Gruben and Gruben 1997; Pieter Broucke, "The First Pantheon: Architecture and Meaning," in Gerd Grasshoff, Michael Heinzelmann, and Markus Wäfler, eds., *The Pantheon in Rome. Contributions to the Conference, Bern, November 9–12, 2006*, Bern 2009, pp. 27–28.

21 Licht 1968, pp. 59–84; Mark Wilson Jones, "The Pantheon and the Phasing of Its Construction,"

in Grasshoff, Heinzelmann, and Wäfler 2009, pp. 68–87, esp. 75–81.

22 Licht 1968, pp. 79–84; Broucke 2009, p. 28.

23 Davies, Hemsoll, and Wilson Jones 1987; Wilson Jones 2000, pp. 200–202.

24 Dressel 1891; Bloch 1947; Lise Hetland, "Dating the Pantheon," *Journal of Roman Archaeology* 20, 2007, pp. 95–112, and Chapter Three in the present volume.

25 Romans measured bricks by the *pes*, or foot (about 29.5 cm). Bipedales were approximately 59 cm x 59 cm x 6 or 7 cm.

26 Wilson Jones 2000, pp. 184 and 211.

27 Today the distinction between the pavonazetto and giallo antico is not obvious, since the ivory hue of the former has been discolored due to the use of acidic cleaning agents.

28 Wolf-Dieter Heilmeyer, "Korinthische Normalkapitelle: Studien zur Geschichte der römischen Architekturdekoration," *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung*. Supplement 16, 1970, pp. 158–161.

29 The Vatican Museums and Sir John Soane's Museum both have capitals from the attic pilasters, for which see A. Uncini, "Due capitelli dal Pantheon nella collezione del Museo Gregoriano Profano ex-Lateranense," *Bollettino dei monumenti musei e galerie pontificie* 8, 1988, pp. 55–63.

30 Alberto Terenzio, "La Restauration du Panthéon de Rome," *Museion* 20, 1932, pp. 52–57; G. De Angelis d'Ossat, "Le rocce adoperate nella cupola del Pantheon," *Atti della Pontificia Accademia della Scienze, Nuovi Lincei* 83, 1930, pp. 211–215; William L. MacDonald, *The Architecture of the Roman Empire*, vol. 1: *An Introductory Study*, London 1965 (2nd ed. rev. New Haven 1982), Chap. 5; Licht 1968, pp. 94–100; 133–142; Lynne Lancaster, "Materials and Construction of the Pantheon in Relation to the Developments in Vaulting in Antiquity," in Gerd Grasshoff, Michael Heinzelmann, and Markus Wäfler 2009, pp. 117–125.

31 Mark Wilson Jones, "Principles of Design in Roman Architecture: The Setting Out of Centralised Buildings," *Papers of the British School at Rome* 57, 1989, pp. 106–151; Wilson Jones 2000, Chapter 4 and pp. 184–186, and 208. See also Gerd Sperling, *Das Pantheon in Rom*, Neuried 1999; Giangiacomo Martines "Argomenti di geometria antica a proposito della cupola del Pantheon,"

Quaderni dell'Istituto di Storia dell'Architettura 13, 1989, pp. 3–10, and Chapter Four in the present volume.

32 Lothar Haselberger, "Architectural Likenesses: Models and Plans of Architecture in Classical Antiquity," *Journal of Roman Archaeology* 10, 1997, pp. 77–94; Wilson Jones 2000, Chapter 3, including Fig. 3.3 for the Temple of Castor and Pollux plan.

33 S.H.A., Hadrian 19.2–13; Procopius 4.6.12–13; see MacDonald 1965, 2nd ed. rev., 1982, pp. 130–131 for English translations. On the career of Apollodorus see MacDonald 1965, pp. 129–134; Wilson Jones 2000, pp. 21–24; Adriano La Regina, ed., *L'arte dell'assedio di Apollodoro di Damasco*, Rome 1999; F. Festa Farina, G. Calcani, C. Meucci, and M. Conforto, eds., *Tra Damasco e Roma: l'architettura di Apollodoro nella cultura classica*, Rome 2001.

34 Heilmeyer 1970, pp. 158–161; Wolf-Dieter Heilmeyer, "Apollodorus von Damaskus – der Architekt des Pantheon," *Jahrbuch des Deutschen Archäologischen Instituts, Römische Abteilung* 90, 1975, pp. 316–347.

35 Dio Cassius, 69.4. See also Wilson Jones 2000, pp. 23–24; Wilson Jones, "Who Built the Pantheon? Agrippa, Apollodorus, Hadrian and Trajan," in *Hadrian: Art, Politics and Economy*, ed. Thorsten Opper, *British Museum Research Publications* 175, London 2013, pp. 31–49.

36 Sible De Blaauw, "Das Pantheon als christlicher Tempel," in *Bild und Formensprache der spätantiken Kunst. Hugo Brandenburg zum 65 Geburtstag, Boreas 17*, Münster, 1994, pp. 13–26; and more generally, Tod A. Marder, "Das Pantheon," in *Rom: Meisterwerke der Baukunst von der Antike bis heute*, Festgabe für Elisabeth Kieven, ed. Christina Strunck, Imhof, 2007, pp. 44–48; and Marder, "The Pantheon After Antiquity," in Gerd Grasshoff, Michael Heinzelmann, and Markus Wäfler, eds., *The Pantheon in Rome: Contributions to the Conference in Bern, November 9–12 2006*, Bern, 2009, pp. 145–153.

37 Richard Krautheimer, *Rome: Profile of a City, 312–1308*, Princeton, 1980, p. 90.

38 Bede, *Historia ecclesiastica gentis anglorum* ii, 4; cf. ed. Charles Plummer, *Venerabilis Baedae Historiam ecclesiasticam gentis Anglorum*, vol. 1, Oxford 1896, p. 88.

39 John Capgrave, *Ye solace of pilgrimes: una guida de Roma per i pellegrini del Quattrocento,* trans. Daniela Giosuè, Rome, 1995.

40 Michael Viktor Schwarz, "Eine frühmittelalterliche Umgestaltung der Pantheon-Vorhalle,"

Römisches Jahrbuch der Bibliotheca Hertziana 26, 1990, pp. 1–29.

41 Antonio Muñoz, "La decorazione medioevale del Pantheon," *Nuovo bullettino di archeologia cristiana* 18, 1912, pp. 25–35; Giovanni Eroli, *Raccolta generale delle iscrizioni pagane e cristiane esistite ed esistenti nel Pantheon di Roma*, Narni, 1895, pp. 237 ff. and 351 ff.

42 Published documention for these campaigns can be found in Eroli 1895 and Muñoz 1912, as well as in the research of Eugène Müntz (1876, 1884), Giovanni Adinolfi (1881), Giuseppe Cugnon (1885), Francesco Cerasoli (1909), and Emmanuel Rodocanacchi (1914), among others. For a hand summary of their work, see David Karmon, *The Ruin of the Eternal City: Antiquity and Preservation in Renaissance Rome*, Oxford, 2011, Chapter 5.

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44 Tilmann Buddensieg, "Criticism and Praise of the Pantheon in the Middle Ages and the Renaissance," in *Classical Influences on European Culture A.D. 500–1500: Proceedings of an International Conference Held at Kings College, Cambridge, April 1969*, ed. R. R. Bolgar, Cambridge 1971, pp. 259–267; Buddensieg, "Criticism of Ancient Architecture in the Sixteenth and Seventeenth Centuries," in *Classical Influences on European Culture AD 500–1500*, ed. R. R. Bolgar, Cambridge, 1976, pp. 335–348; Tod A. Marder, "Bernini and Alexander VII: Criticism and Praise of the Pantheon in the Seventeenth Century," *Art Bulletin*, 71, no. 4, 1989, pp. 628–645; Wilson Jones 2000, pp. 187–191.

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46 Andrea Palladio, *I quattro libri dell'architettura*, Venice 1570, Book IV, Chapter XX.

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50 Louise Rice, “Bernini and the Pantheon Bronze,” *Sankt Peter in Rom 1506–2006. Beiträge der internationalen Tagung vom 22–25 Februar 2006 in Bonn*, ed. Georg Satzinger and Sebastian Schütze, Munich, 2008, pp. 337–352; Rice, “Urbano VIII e il dilemma del portico del Pantheon,” *Bollettino d'arte*, 143, 2008, pp. 93–110; Rice, “Pope Urban VIII and the Pantheon Portico,” in Grasshoff, Heinzelmann, and Wäfler 2009, pp. 155–156. See now, Carolyn Y. Yerkes, “Drawings of the Pantheon in the Metropolitan Museum's Goldschmidt Scrapbook,” *Metropolitan Museum Journal* 48, 2013, pp. 87–120.

51 Heinrich Thelen, *Francesco Borromini: Die Handzeichnungen*, Graz, 1967, vol. 1, pp. 32–37; Howard Hibbard, *Carlo Maderno and Roman Architecture 1580–1630*, London 1971, pp. 230–231.

52 Tod A. Marder, “Alexander VII, Bernini and the Urban Setting of the Pantheon in Seventeenth Century,” *Journal of the Society of Architectural Historians* 50,1991, pp. 273–291, and Chapter Ten in this volume.

53 Marder 1989.

54 Tod A. Marder, “Specchi's High Altar for the Pantheon and the Statues by Cametti and Moderati,” *Burlington Magazine* 122, 1980, pp. 30–40. Along with other recommendations for the commission, Specchi had just published his book of engravings of *Disegni di vari altari e cappelle nelle chiese di Roma* in 1713.

55 Marder 1980.

56 Susanna Pasquali, “From the Pantheon of Artists to the Pantheon of Illustrious Men: Raphael's Tomb and Its Legacy,” in Wrigley and Craske 2004, pp. 35–56.

57 Pasquali 2004 pp. 36–38; Giuseppe Bonacorso and Tommaso Manfredi, in *I Virtuosi al Pantheon 1700–1758*, Rome 1998, give the statutes of the confraternity (pp. 8–11) and a full account of its activities of the period.

58 See Pasquali 2004 for this paragraph. Also see Eveline G. Bouwers, “A Papal Pantheon? Canova's ‘Illustrious Italians’ in Rome,” in *Public Pantheons in Revolutionary Europe: Comparing Cultures of Remembrance, c. 1790–1840*, ed. Eveline G. Bouwers, New York 2012, pp. 132–160.

59 Pasquali 2004, p. 48, quotes Stendhal writing in 1817: “Sooner or later it will no longer be known as a church, which in times past protected it against the spirit of Christianity. It would be a sublime museum.”

60 See the 1836 painting of the event by Francesco Diofebei in the Thorwaldsen Museum Copenhagen.

61 Susanna Pasquali, *Il Pantheon: architettura e antiquaria nel Settecento a Roma*, Modena 1996.

62 All citations are from Pasquali 1996a, and included in Tod A. Marder, "Symmetry and Eurythmy at the Pantheon: The Fate of Bernini's Perceptions from the Seventeenth Century to the Present Day," in *Antiquity and Its Interpreters*, ed. Alina Payne, Ann Kuttner, and Rebekah Smick, New York 2000, pp. 217–226.

63 Marder 1989; Pasquali 1996a; Marder 2000.

64 In connection with that work, the ministers of Clement XI once again rebuilt the booths and stands of the street merchants within restricted boundaries, for which see Tod A. Marder, "Piazza della Rotonda e la Fontana del Pantheon: un rinnovamento urbanistico di Clemente XI," *Arte illustrata* 7, 1974, pp. 310–320.

65 Attilio LaPadula, *Roma e la regione nell'epoca napoleonica*, Rome 1969, pp. 121–122.

66 LaPadula 1969, docs. 260–261 and Plates XLII, XLIV, and XLV.

67 Camille De Tournon, *Etudes statistiques sur Rome et la partie occidentale des états romains*, 2nd ed., Paris 1855, pp. 277 and 306, and Plate 30. Carlo Fea, *Dei diritti del principato sugli antichi edifizj publici sacri e profani in occasione del Panteon di Marco Agrippa: memoria*, Rome 1806; and Fea, *L'integrita' del Panteon di M. Agrippa ora S. Maria ad martyres rivendicata al principato*, Rome 1807, provide additional documentation.

68 Emma Marconcini in Luisa Cardilli, ed., *La Fontana del Pantheon*, Rome 1993, pp. 31–45; Alberto M. Racheli, *Restauri a Roma 1870–1990. Architettura e città*, Venice 1995, pp. 354–357.

69 Ceen 2009, pp. 127–138. Directed by Alessandro Viviani, the Master Plan (Piano Regolatore) of 1873 sought to render the "intricate labyrinth of narrow streets" more "permeable." The 1883 Piano Regolatore, which again included the participation of Viviani, anticipated widened streets between the Maddalena and the Pantheon, but no demolition of the intervening city block. Under the direction of Edmondo Sanjust di Teulada the 1909 Piano Regolatore sought to minimize the necessity of crossing the historic center, much of which was to remain intact. In the 1931 Master Plan for Mussolini, drawn by a committee that included Marcello Piacentini, Gustavo Giovannoni, and Antonio Muñoz, the intervening city block was again to be demolished.

70 Alberto M. Racheli, *Restauro a Roma 1870–2000*, Milan, 2000, pp. 354–357.

71 Published as Luca Beltrami, *Il Pantheon; la struttura organica della cupola e del sottostante tamburo, le fondazioni della rotonda, dell' avancorpo, e del portico, avanzi degli edifici anteriori alle costruzioni adrianee. Relazione delle indagini eseguite dal R. Ministero della Pubblica Istruzione negli anni 1892–93, coi rilievi e disegni dell' architetto Pier Olinto Armanini*, Milan 1898.

72 Our thanks to Carla Trovini for clarifying the career of Comparini.

73 Racheli 2000, p. 356; Gian Paolo Consoli, "Dal primato della città al primato della strada: il ruolo del piano di Armando Brasini per Roma nello sviluppo della città fascista," *L'architettura nelle città italiane del XX secolo. Dagli anni Venti agli anni Ottanta*, ed. Vittorio Franchetti Pardo, Milan 2003, pp. 203–11. Our thanks to Carla Trovini for this reference.

74 Racheli 2000, p. 356.

75 Racheli 2000, p. 357.

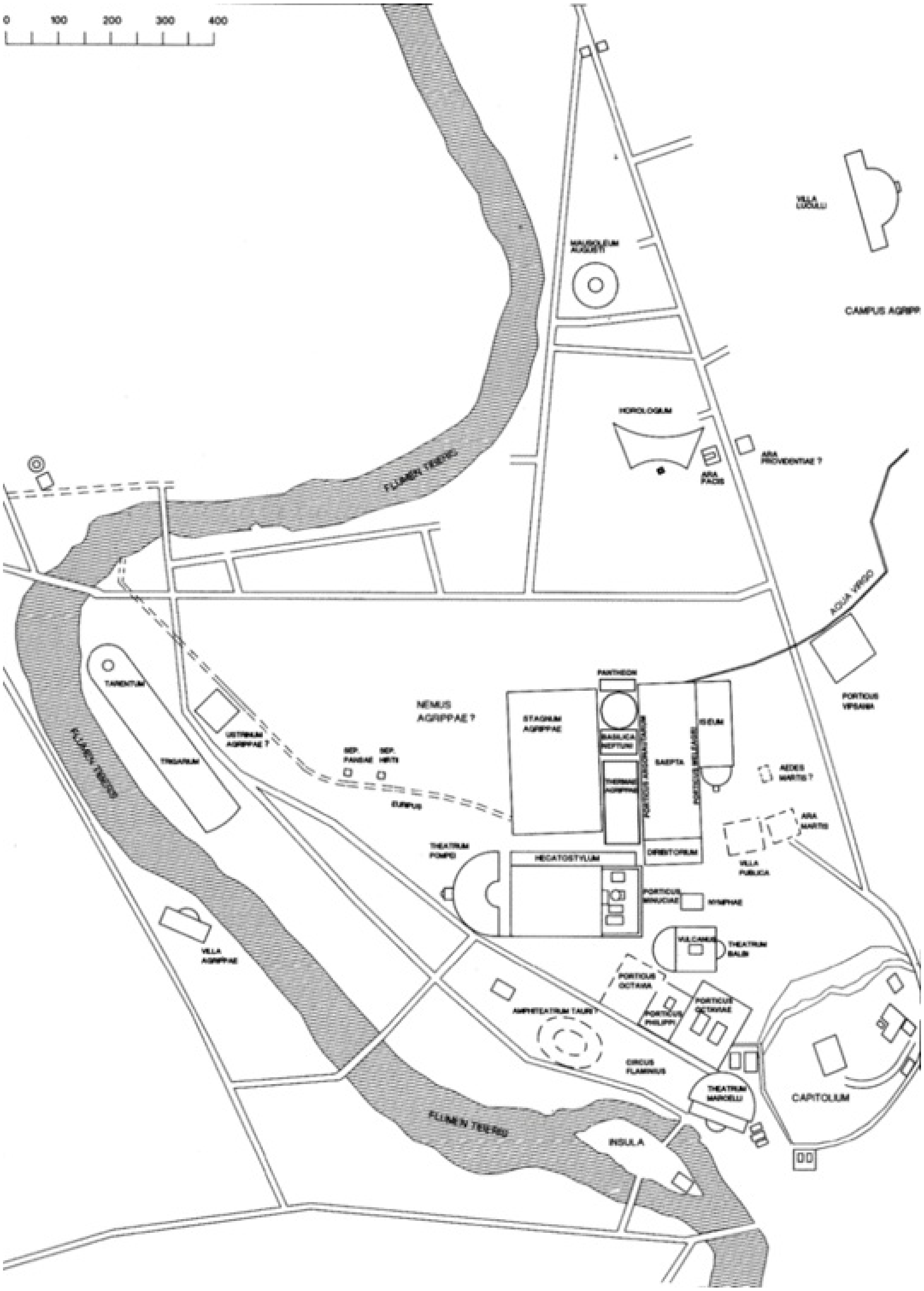
76 Belardi 2006, pp. 181–194.

Two Agrippa's Pantheon and Its Origin

Eugenio La Rocca

The Campus Martius, the Pantheon, and Dio Cassius's Account

The vast flat area outside the Servian Wall circumscribed by the Campidoglio, the Tiber, and the slopes of the Quirinal and Pincian hills was traditionally reserved for military exercises associated with the war god Mars, from whom the name Campus Martius was derived. Initially on the fringes of the city, the area was progressively monumentalized in the course of the Republican and Augustan periods, when prominent buildings devoted to public and political functions were laid out (Fig. 2.1). Many of these were commissioned by Augustus's chief ally and son-in-law, Marcus Agrippa, whose military successes had generated enormous wealth. Bounded by his own public bath complex to the south and an artificial pool called the *stagnum* to the west, and by the Saepta Iulia (a building begun by Julius Caesar housing a voting precinct, dedicated in 26 BC), the Pantheon was constructed by Agrippa and dedicated in 27 or 25 BC.[1] Little is known about Agrippa's Pantheon. It apparently suffered damage in AD 80, during a fire that devastated a sector of the Campus Martius, from the Baths of Agrippa all the way to the Temple of Jupiter on the Capitoline. Domitian carried out reconstruction work of an unknown extent,[2] but lightning struck during the reign of Trajan, giving rise to the reconstruction finished by Hadrian, and for that reason the Pantheon that survives to our day is referred to here as the Hadrianic building (but see the chapter by Lise Hetland).[3] An understanding of that building obviously begins with its Agrippan predecessor.



2.1. Plan showing the Campus Martius in the Augustan period. (Coarelli 1997, modified by the author)

What we know of Agrippa's monument is deduced almost exclusively from the writings of Dio Cassius, a second-century AD historian and political leader. Born in Nicaea in Bithynia, Dio had a relatively bright career under the Severan dynasty, becoming consul twice. His accounts of the much earlier Augustan period were based on firsthand information from his predecessor Livy, from the historical accounts (*breviaria*) of Augustus himself, and from the autobiographies of both Agrippa and Augustus's confidante Gaius Maecenas. In addition, Dio would have had access to the senatorial archives because of his rank. The following passage is the main evidence on which to base an interpretation of the original Augustan Pantheon, a building Dio knew only in its Hadrianic redaction:

> [I]n addition [Agrippa] concluded the construction of the building called the Pantheon, given this name probably because among the statues that adorn it are included images of many gods, among which are also Mars and Venus, even though in my opinion the reason can be ascribed to the domed vault, which represents the heavens. Agrippa wanted then to place there also [a statue of] Augustus and to bestow upon him the honour of having the work named after him; but since the prince did not accept either of these two honours, he had placed in the temple a statue of [Julius] Caesar *pater*, while in the porch he put statues of Augustus and himself.
>
> (Dio Cassius, LIII, 27)

Dio seems to have chosen his terms in Greek cautiously, avoiding a precise definition of Augustus's statue and distinguishing the divinities inside the building from those in the porch. Although an exhaustive study of the changing meanings of his terminology is lacking,[4] he appears to have differentiated between cult statues (*agalmata* and *theon eikones*) and statues like those for Augustus and Agrippa (*andriantes*), which were not intended as objects of worship.[5] In describing these statues, Dio accords them religious but not divine status; more significant than merely honorary, these statues bore a close affinity with those of the interior.

Dio's text also reveals that in line with Hellenistic tradition, Agrippa had attempted to dedicate a temple to Augustus by presenting him in the immediate context of the Olympian gods. This gesture would not have been a true divinization (which neither the moment nor Roman tradition permitted), but rather an attempt to offer a statue of the *princeps* (first citizen) to the immortal gods. Worship rendered to the gods would thereby accrue to Augustus, who was thus allied to a god according to formulas established in the Hellenistic period by Alexander the Great and his successors.[6] A location within the temple would have been interpreted as an unacceptable sign of divinization before death, yet the potential for divinization was implicit in placing the statues of Agrippa and Augustus in the porch.

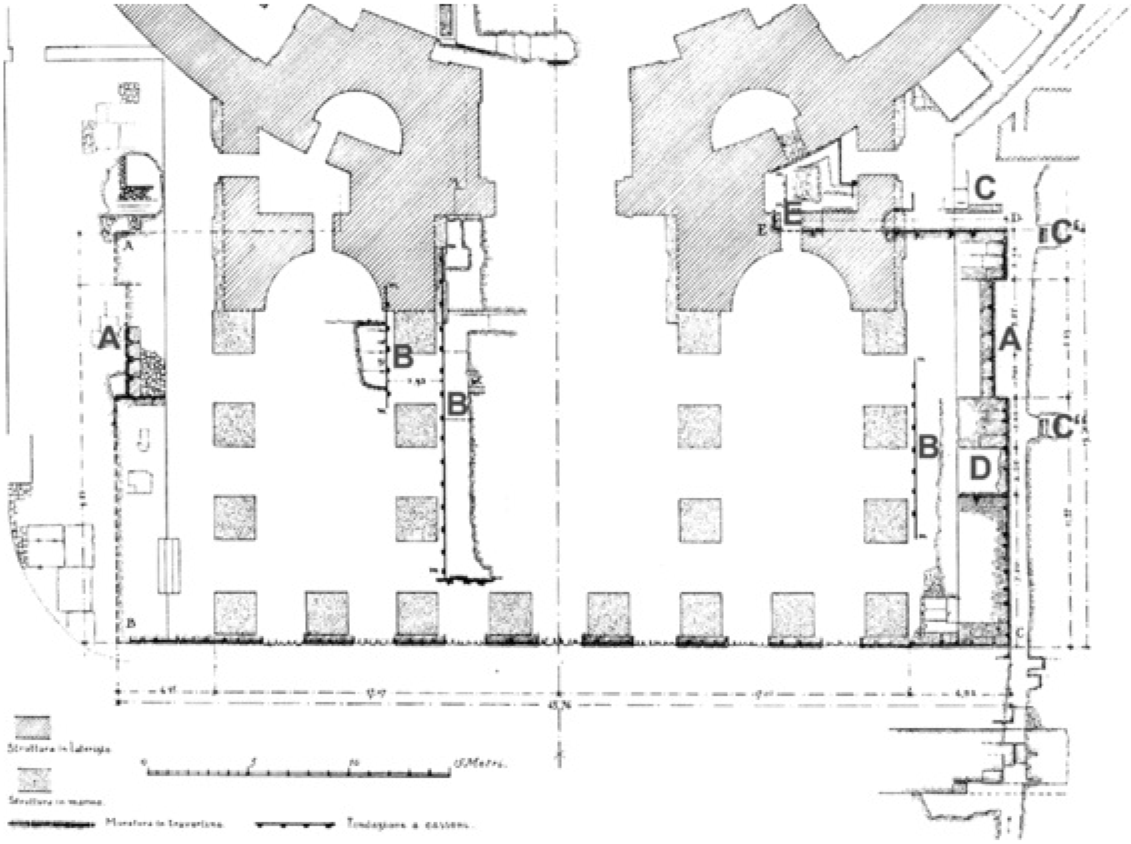
Inside the cella, the statue of Julius Caesar stood in the company of gods that included Mars and Venus, progenitors of the Romans and of the *gens Iulia*, the family line of Caesar and his adopted son. Dio's text makes it clear that Caesar was placed in the temple both as a god and the adoptive father of Octavian/Augustus.[7] Although less blatant, the Hellenistic custom of promoting a ruler cult pervades the entire figurative program of Agrippa's Pantheon. Had the statue of Augustus been placed in the cella in keeping with Agrippa's initial idea, the emperor's quasi-divine status would have been apparent; consistent with this is Dio's remark that the Pantheon should have been called *Augousteion*, following the Greek custom of naming a sacred building after the divinity venerated there. In the end, the name Pantheon prevailed (at least from the Neronian period onward) indicating worship of all the gods.[8] Among those gods was the divine Caesar, a mortal deified after his assassination; at its doors were statues of his living adopted son and his general, awaiting admission to the cella. These implications were encouraged by the building's location. Wedged between the Saepta Iulia to the east and the stagnum Agrippae to the west, the Pantheon stood in the *palus caprae*, or Goats' Marsh, a place predestined, it seems, for apotheosis. In fact here, according to one tradition, Romulus experienced his consecration and ascent to the heavens.[9] The site was thus redolent of kindred associations that could have attached themselves to Augustus and his right-hand man.

The Physical Traces of Agrippa’s Pantheon: The Investigations of Chedanne and Armanini

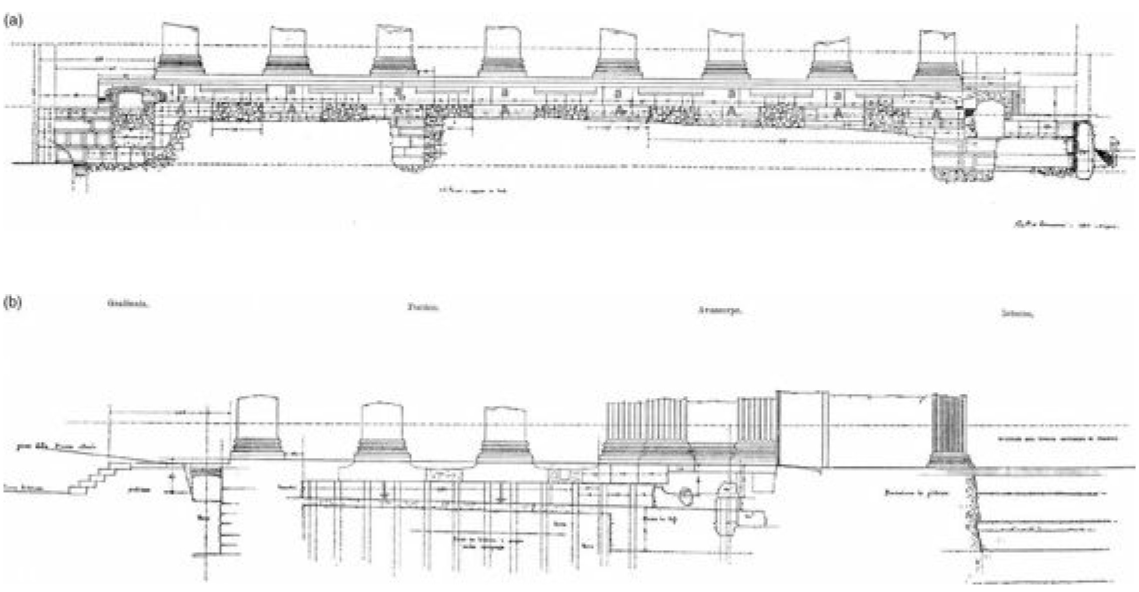
Excavations conducted in the late nineteenth century by the architects Georges Chedanne and Pier Olinto Armanini and published in incomplete form by Luca Beltrami formed the basis for a modern understanding of Agrippa’s Pantheon, although their implications were not properly understood at the time.[10] These excavations revealed the following:

1. The remains of a preexisting podium survive below the podium of the Hadrianic colonnade (see Plate I). Of noticeably greater width (Fig. 2.2), this earlier podium was made of concrete with chips of Monteverde tufa and occasional sections of travertine and brick, and was mostly covered by a massive cap of travertine blocks up to 3 meters deep.[11] On the front, where the edges of the pre-Hadrianic and Hadrianic podia coincide, thick load-bearing travertine piers were incorporated into the concrete. By a simple upward extension, they were adapted to support the Hadrianic colonnade (Fig. 2.3a). Inside the portico, the Hadrianic columns rest on a concrete foundation constructed with a reinforcing system inserted into the preceding podium (Figs. 2.2, 2.3b, 2.4, and see Plate XI).[12]
2. A paved floor once existed in the entrance portico at a depth of approximately 1.50 meters below the current pavement. To judge from the remains of a bed on which impressions of paving slabs are visible, this floor inclined downward from north to south (Figs. 2.3b (arrows) and 2.5, C, D).[13]
3. Another pavement existed inside the rotunda, at a depth of 2.15 meters below the current one (see Plates XIX, b'–b", and XX, b"). Here again, impressions of paving slabs were preserved. The discovery of two fragments of *pavonazzetto* (a white marble with purple or yellow veining), along with a third, unidentified one, indicates that these slabs consisted of prized colored marbles.[14] The slabs were set along an east–west and north–south alignment, with alternating intervals suggesting some sort of floor pattern (see Plate XVIII, red arrows).[15]
4. A cohesive mass of concrete survives 1 meter below the preceding pavement and 3.15 meters under the current level. With a thickness of around 1.20 meters, this raft rested on a stratum of alluvial clay belonging to an old bed of the Tiber River (see Plates XIX, e, and XX, g).[16]

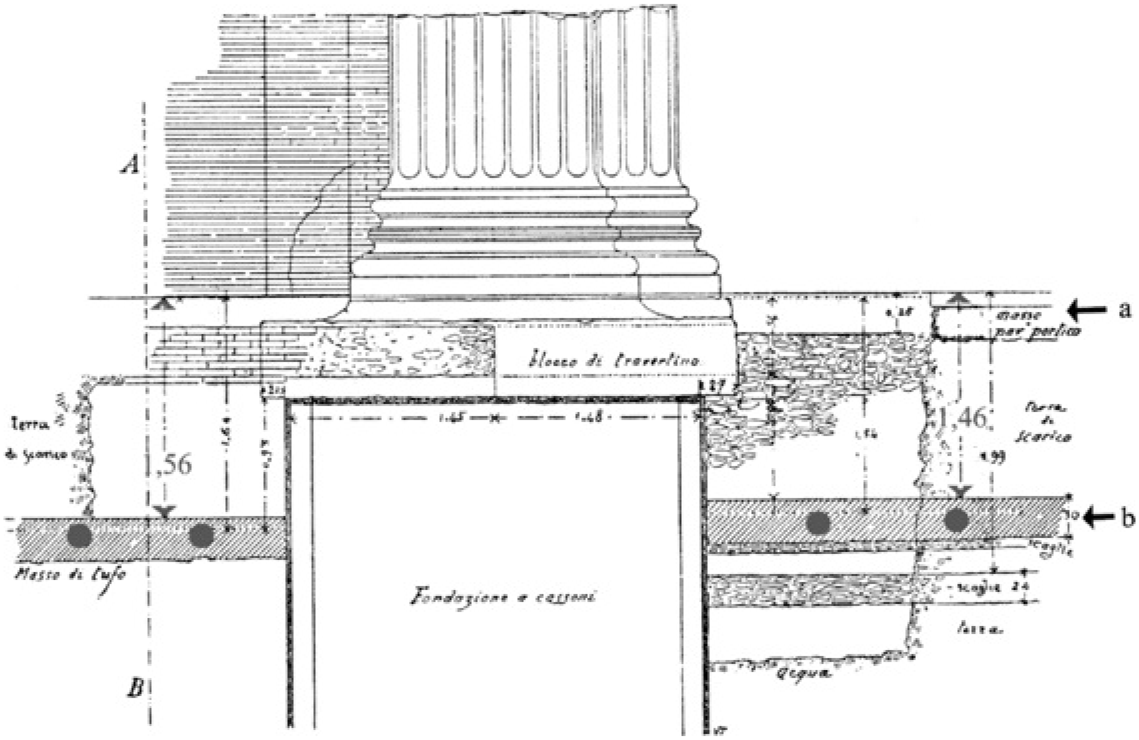
Past readings of this evidence led to erroneous conclusions regarding both the chronology and form of the Agrippan Pantheon, on account of a series of flawed premises. First, it was assumed that the edifice faced or opened to the south, and had a rectangular cella arranged in transverse fashion on the site of the present portico (see Fig.1.3). Second, it was assumed that the colored marble pavement 2.15 meters below the current floor belonged to an area thatwas open to the sky.[17] Third, it was assumed that this space constituted a sort of forecourt to the rectangular temple cella. Fourth, it was assumed that the layer of concrete 3.15 meters under the current pavement represented the foundation for the paving of the present edifice, which the investigators considered to be Agrippa’s Pantheon.



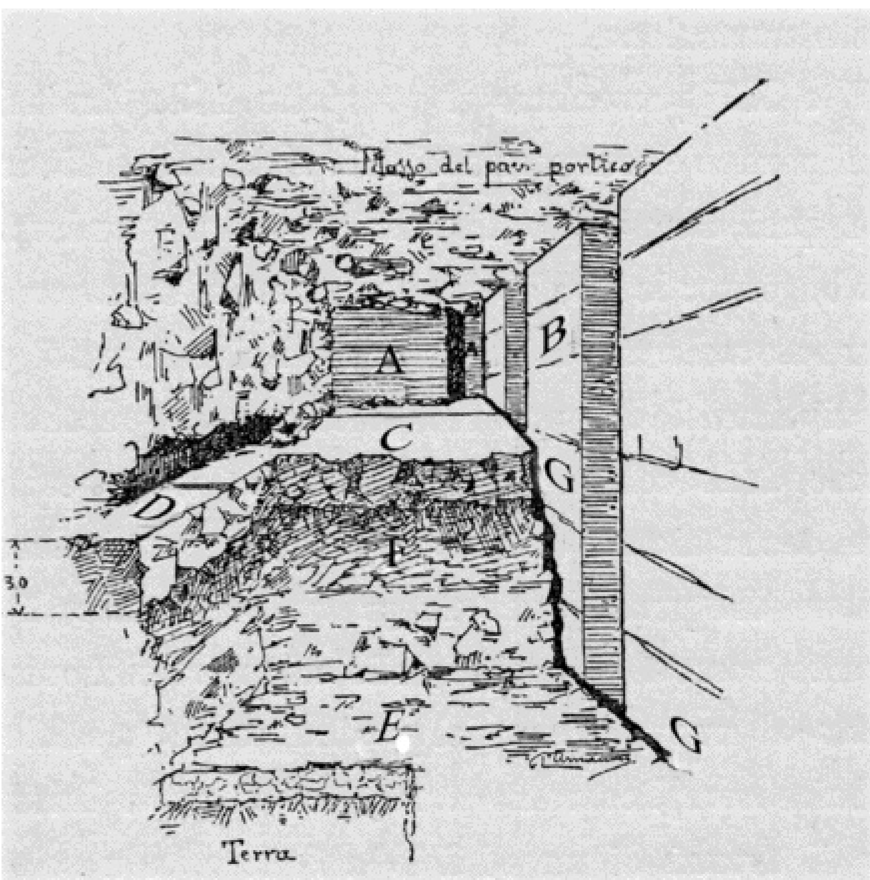
2.2. Plan of excavations under portico in 1892–1893. A is edge of pre-Hadrianic podium; B is edge of Hadrianic concrete foundations; E is return to south of pre-Hadrianic foundation. (Pier Olinto Armanini in Beltrami 1898, Fig. XXXV, with new annotations)



2.3. a) Transverse section showing column bases and foundations of portico built over their pre-Hadrianic counterparts, and b) longitudinal section of trench cut in the central aisle of portico, revealed in excavations of 1892–1893; arrows indicate the pre-Hadrianic pavement. (Pier Olinto Armanini in Beltrami 1898, Figs. XIV and XII)

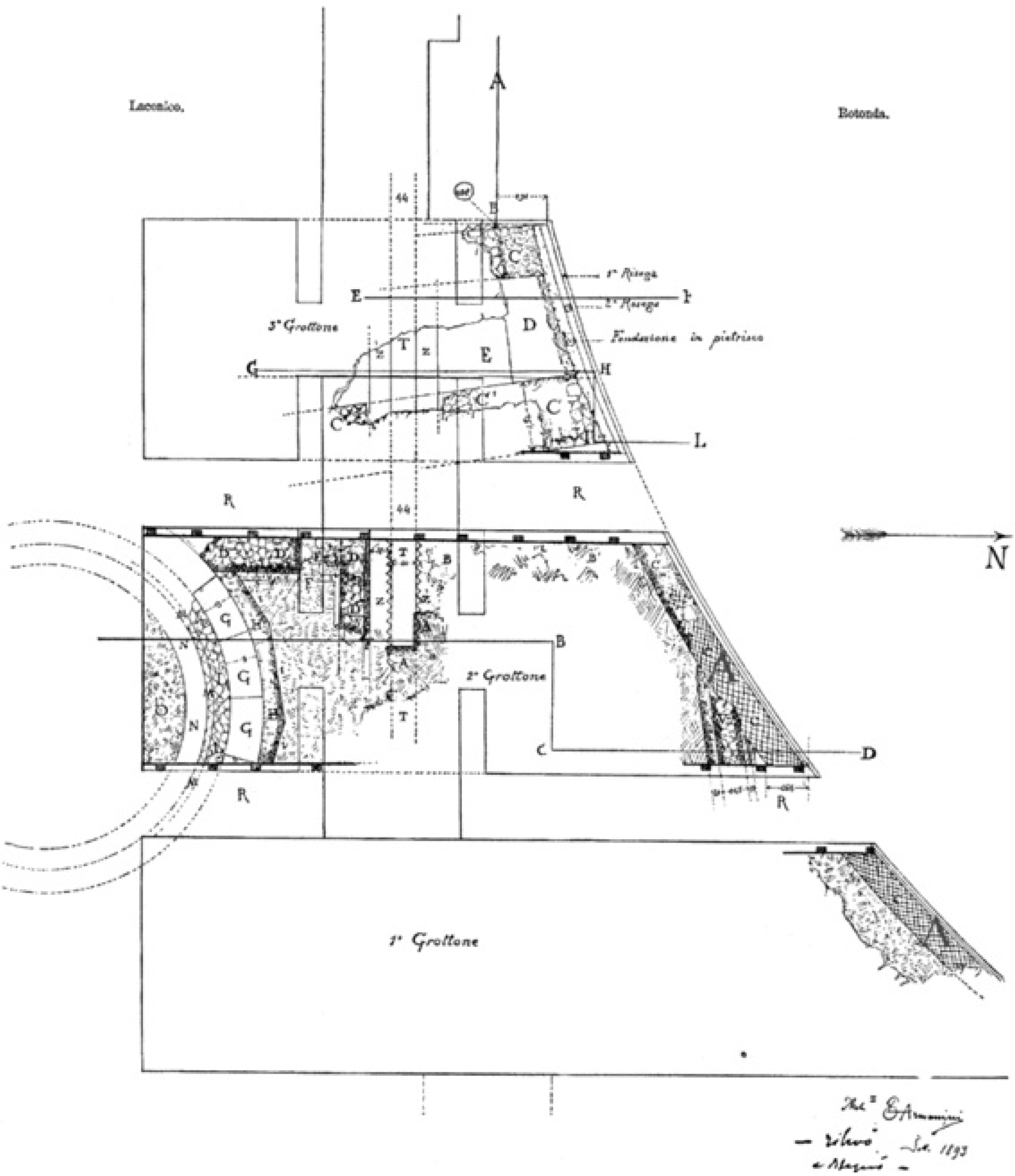


2.4. Section of pilaster framing east side of entrance portal and substructure, revealed in excavations of 1892–1893. a = substructure of present floor; b = substructure of pre-Hadrianic floor. (Pier Olinto Armanini in Beltrami 1898, Fig. X)



2.5. Annotated sketch of structures exposed under portico during excavations of 1892–1893. A = travertine extension of original pier foundations of facade; B, G = supplementary concrete foundations for inner portico columns; C, D = pre-Hadrianic pavement. (Pier Olinto Armanini in Beltrami 1898, Fig. XIII)

It was Rodolfo Lanciani who first posited the existence of a sort of vestibule that was circular in shape (see Plate XIV). He based this conclusion on the presence of a section of wall in reticulated masonry with a curved top – the so-called muro cordonato (encircling wall) discovered during the excavations and attributed to the Augustan building phase (Fig. 2.6, A, and Plate XX).[18] According to his theory, in Domitian's time this space constituted a forecourt which, via a flight of steps (under the intermediate block of the present building), led up to the south-facing oblong building located under the existing portico (see Fig. 1.3). Despite well-founded objections,[19] Lanciani's almost-undisputed authority enabled these ideas to persist until quite recently.[20]



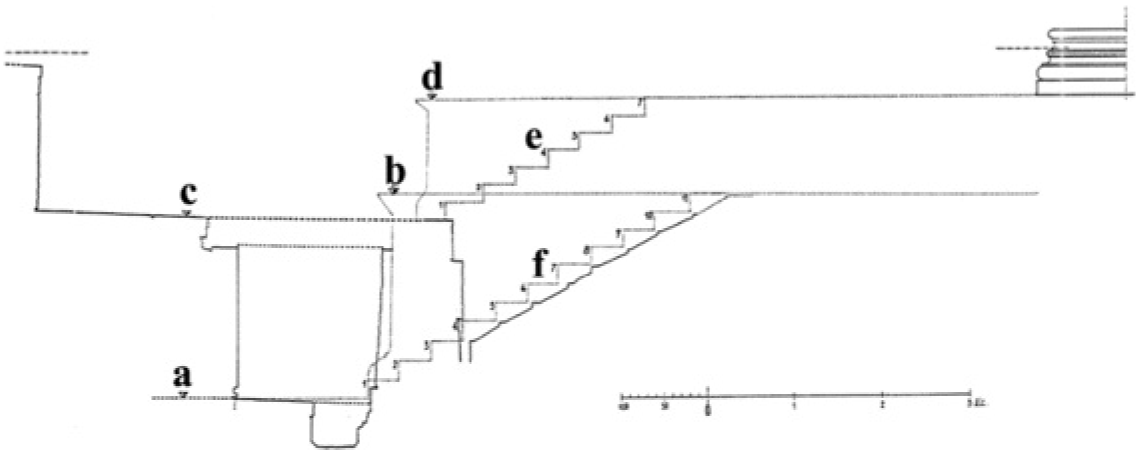
2.6. Partial plan of 1892–1893 excavations in southeast quadrant of rotunda. The cross-hatching indicates the so-called muro cordonato or encircling wall attributed to the Augustan phase. (Pier Olinto Armanini in Beltrami 1898, Fig. XXV)

The 1996–1997 Excavations and Their Interpretation

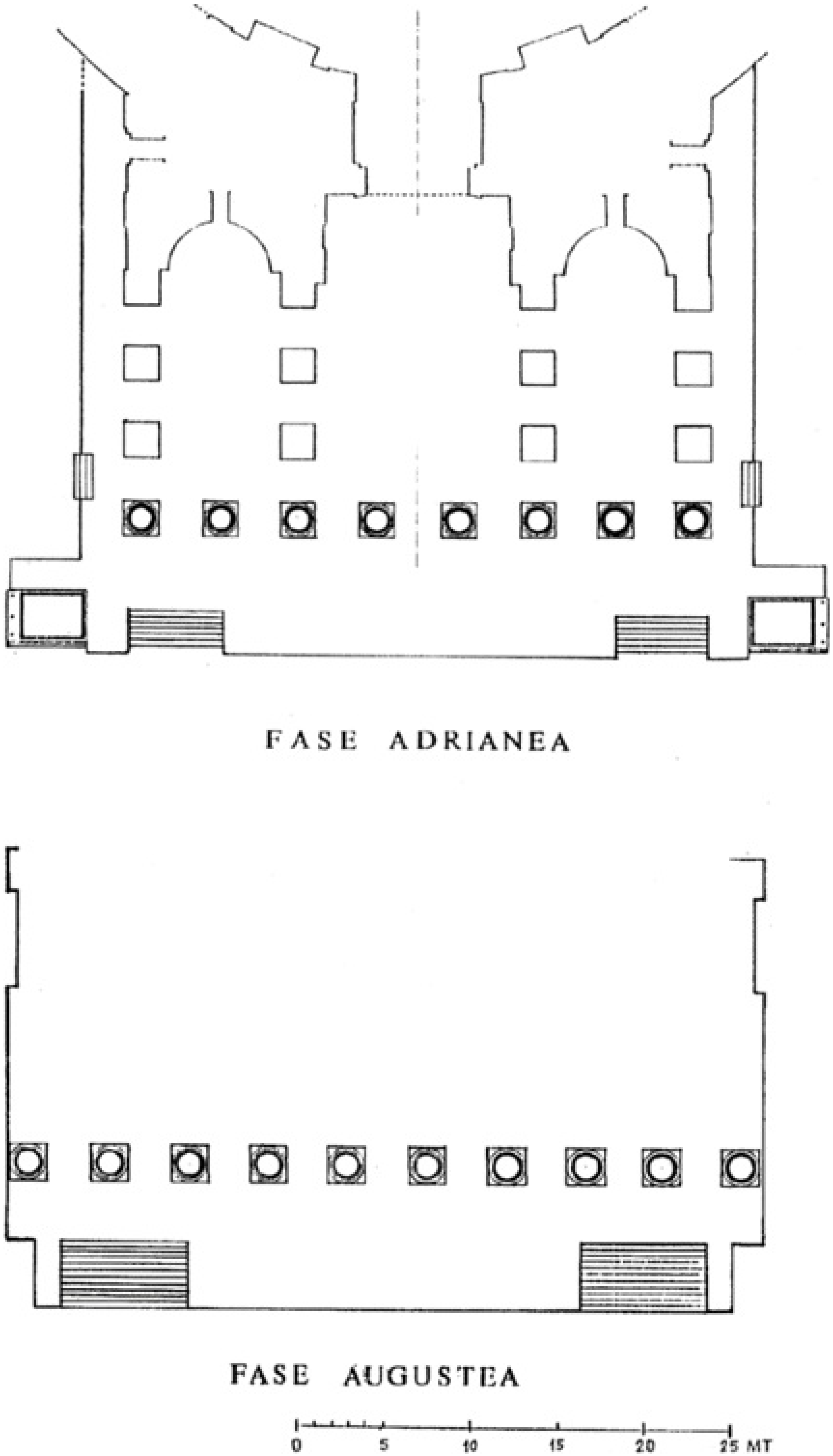
Curiously enough, the excavations of Chedanne and Armanini did not in fact corroborate Lanciani's

reconstruction. Nor was it vindicated by the investigations of Paola Virgili and Paola Battistelli along the facade of the Pantheon in 1996–1997, which were published with the support of Giovanni Joppolo's surveys.[21] This recent activity has advanced our knowledge of the early structures in several respects.

The recent archaeological investigation brought to light the staircase at the front of Hadrian's temple, which is now obliterated by the modern piazza, as well as the paving of the forecourt that lay in front of the building (Fig. 2.7, e).[22] The stairs rose 1.30 meters above the Hadrianic paving of the forecourt to the temple's podium (Fig. 2.7, d). The staircase was composed of seven steps and was adjoined by a fountain at each end. These fountains were composed of Proconnesian marble basins, with brick foundations to support statues from which issued the waters of the Acqua Vergine (Fig. 2.8). The fountains should be connected with the Pantheon as rebuilt after Agrippa's time, for beneath their remains lay traces of a preexisting building. Importantly, that building had a similar configuration to the one we admire today, except that the staircase, of which traces survive under the present one, was composed of 11 steps (Figs. 2.7 and 2.8).[23]



2.7. Section reconstruction of two stairs belonging to the (e) present Pantheon and (f) Agrippan Pantheon; a and b denote surrounding level and podium of pre-Hadrianic building; c and d are those for Hadrianic building. (Drawing by Giovanni Joppolo)



2.8. Actual plan of portico (top) compared to Agrippa's portico (bottom). (Drawing by Giovanni Joppolo)

The evidence recently excavated demonstrates conclusively that the pre-Hadrianic building faced north, as Chedanne had believed and as Heinrich Nissen perceptively conjectured.[24] Moreover, the columns of the Hadrianic portico stand on the travertine foundation pillars of the earlier structure, and so both phases must have had comparable intercolumniations and column diameters (Fig. 2.3).[25] Because the pre-Hadrianic podium was wider than the later structure, it may have had either a decastyle (10-column) facade or an octastyle facade flanked by two *antae* (terminal walls) (Fig.2.8).[26]

The pre-Hadrianic podium slopes appreciably toward the south, as Beltrami and Chedanne

detected (see Plates XI, XIX, and XXI). The cause, it would seem, was the weight of the superstructures, and the slope was partially corrected during the construction of the later foundations.[27] The difference in level between the pavings 1.50 meters under the portico and 2.15 meters under the rotunda is explained by this southward slope (Fig. 2.3b).[28]

Although literary sources document a Domitianic reconstruction, no physical trace of it has been found, nor any carbonized debris consistent with destruction by fire.[29] In any case, it is unlikely that Domitian's intervention incorporated fundamental alterations to the structure, given that the level of the Augustan podium remained unchanged until the Hadrianic renewal.

Doris and Gottfried Gruben have hypothesized that the present entrance, with its threshold in *marmo africano* and great bronze doors flanked by two pilasters (see Figs. 1.8 and 7.14), belonged in modified form to the Augustan Pantheon.[30] This thesis suggests that elements of the original building survived successive disasters and were carefully preserved. If true, there is all the more reason to assume that Domitian's intervention was of little significance.[31] Only the fire of AD 110 definitively destroyed Agrippa's building. Continuity between the Agrippan portico and its Hadrianic successor would also seem to be affirmed by the reprise of the Agrippan dedication carried in the inscription under the pediment. Indeed, the inscription would be much more difficult to reconcile with a total reversal of orientation and change of structure.[32]

We can now turn to the part where the present rotunda stands. Its exterior face coincides closely with the wall of *opus reticulatum* (the so-called muro cordonato, or "encircling wall," that Lanciani attributed to the Augustan phase; Fig. 2.6). This wall is only 61 centimeters thick and its top is rounded, indicating that it could not have supported a vaulted structure. For this reason, William Loerke conjectured an open-air or hypaethral space, perhaps ringed by a barrel-vaulted annular colonnade, an idea that has been visualized in Plate XV. The exedras of the Sanctuary of Fortuna Primigenia at Palestrina offer a parallel, as does the so-called Maritime Theatre at Tivoli (whose internal diameter is fractionally less than that of the Hadrianic Pantheon).[33] In Agrippa's building, an upper order could have masked the vault and incorporated the caryatids of Diogenes of Athens extolled by Pliny.[34]

Yet this hypothesis has its flaws. For example, so far as we know, spaces that were completely hypaethral – open to the sky – were not paved with colored marbles because of the inevitable weathering and wear to which they would have been subjected.[35] The colored marble paving observed during the soundings of 1892–1893 (Plates XI, XIX, b'–b", and XX) appeared to be cut at the edges by the foundations of the rotunda. With patterns oriented east–west, this floor covered the entire interior space and not just the ring-shaped colonnade that would have been the only suitable location for a precious marble paving. Beltrami unfortunately offered limited information in this regard, but he did record slabs of varying sizes, and nothing excludes the possibility of larger slabs of white marble or travertine in the central area, with colored marbles under a perimeter portico. But by the same token, nothing excludes the possibility that the entire area was roofed with the exception of a central space crowned by an *opaion*, or oculus, analogous to the effect visible today. That traces of supports for such a roof have not been found cannot be considered a conclusive counterargument to this idea, given the limited archaeological surveys carried out in the rotunda.

In any event, the reticulated muro cordonato seems to represent the outermost boundary of the

building.[36] Its form recalls the enclosures of funerary monuments,[37] leading us to wonder if the demarcation of the Augustan building was considered binding for its Hadrianic successor. If so, the foundation of the Augustan cella must have been swallowed up by that of the Hadrianic rotunda, which would explain why no trace of the former has been discovered. In conclusion, the new structure will likely have preserved the dimensions of the preexisting building.

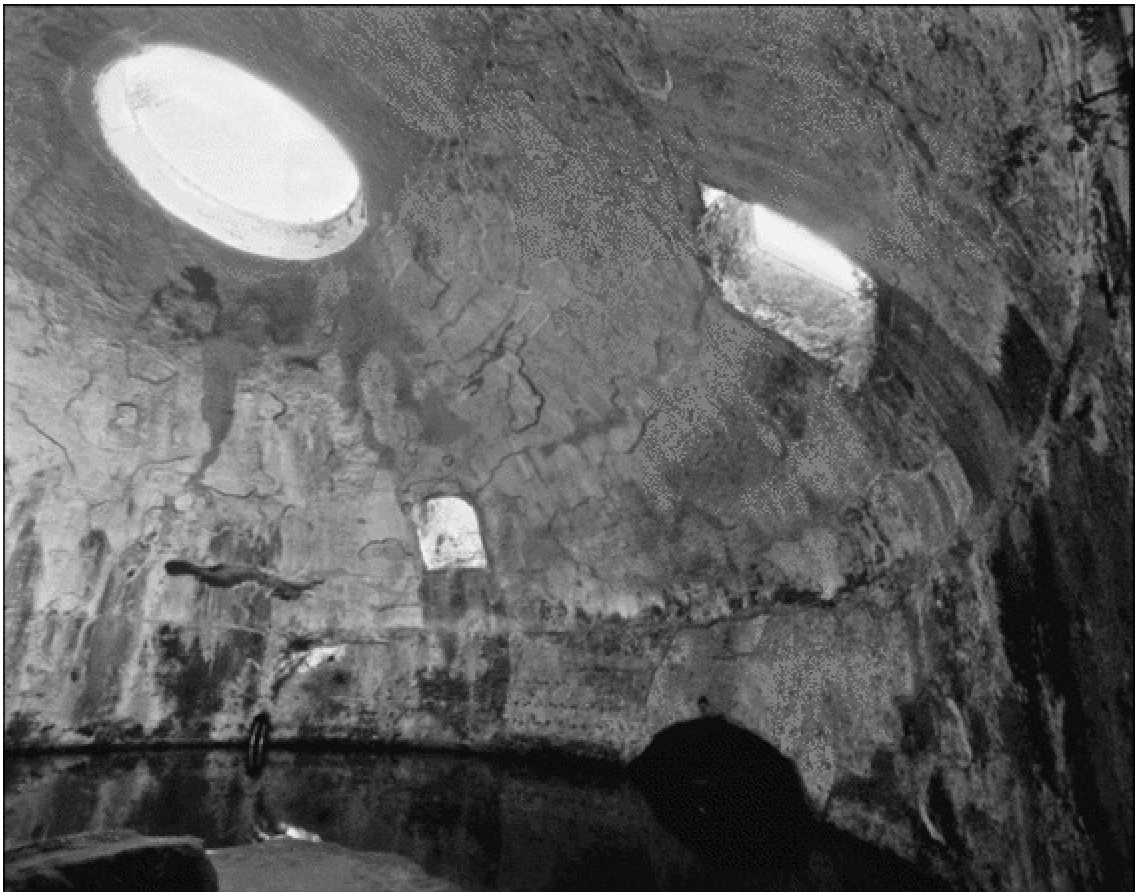
The Relationship between the Agrippan Pantheon and the Hadrianic Pantheon

As we have seen, the Hadrianic rotunda fits neatly inside the Augustan precinct (Plates XIV and XV), while the facade columns sit exactly over their predecessors. The Hadrianic building, like so much Roman architecture, was set out according to an elemental geometry: In the circle locating the centers of the interior columns, a square with sides of about 32 meters can be inscribed. This measurement equals the width of the octastyle colonnade of the portico, enabling us to visualize a second square touching the first (Fig. 1.5 and Plate XII). Since the porticoes of the Augustan and Hadrianic plans substantially coincide, it seems that the mathematical scheme used for the Augustan plan provided the core from which the present Pantheon developed.[38] The available documentation indeed suggests that, on the whole, the plan of the Augustan Pantheon – though not the elevation – resembled that of the Hadrianic Pantheon.[39]

Even if the reconstruction of the Augustan Pantheon produced by the Grubens turns out to be incorrect, their astute suggestion that the portal of the present building could have come from its predecessor adds a further element of continuity between the two structures.[40] Such continuity must reflect an underlying conceptual motivation going beyond the symbolic value that the Grubens note was invested in the door since Homer’s day. The possible reuse of elements from the original building and the reiteration of its plan help us make sense of the ostentatious reassertion of Agrippa’s legacy by means of the bold dedicatory inscription under the pediment that was still relevant and even suggestive after a century and a half, even in political and sociocultural conditions very different from those of the Augustan period.

Precedents for Agrippa’s Pantheon and Its Constructive System

The Augustan structure cannot have had a concrete vault. As is generally accepted, the technical conditions necessary to vault such a large space did not yet exist. The Romans’ technical boldness from the time of the late Republican period using concrete for both innovative and structurally complex designs – including those with vaulted roofs and semicircular exedrae – was certainly exceptional. However, no surviving buildings from this period remotely approach the gigantic dimensions of the Pantheon. The so-called Temple of Mercury at Baiae, in reality a bathing hall or an artistically elaborated pool around a thermal spring, still conserves its concrete dome (Fig. 2.9).[41] Circular in plan, with a central oculus and large windows at the haunches of the vault, its appearance bears some similarity to the Hadrianic Pantheon. Yet its diameter of approximately 21.60 meters is less than half as big.



2.9. Temple of Mercury, Baia. (Courtesy of Luciano Pedicini)

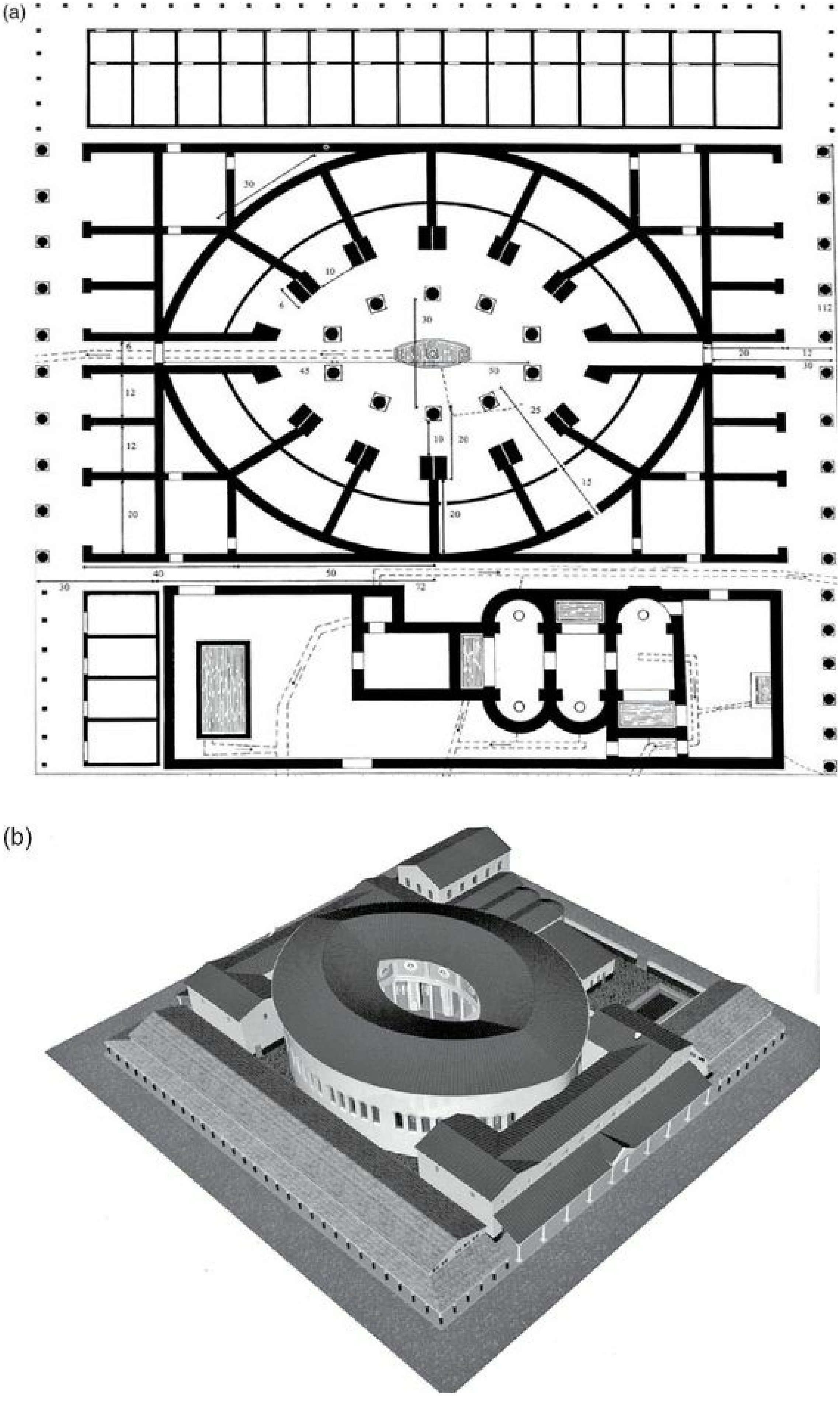
Roman architecture in the Augustan period excelled instead in the construction of trussed roofs, as confirmed by the Diribitorium, the ancient voting hall in the Campus Martius that was famed for the wide span of its roof, some 30 meters in length; similarly, the Basilica Giulia was 101 meters long and 49 meters wide, including the side aisles.[42] The exedrae of the Forum of Augustus, comparable in radius to the Pantheon, had wooden roofs covered in stucco.[43] Thus, large-span wooden roofs were certainly within the Romans' technical capability. Behind it lay a Greek inheritance of buildings that were circular in plan and roofed using timber, such as the Arsinoeion of Samothrace (although this had a relatively small diameter).[44] The evidence offers sufficient grounds to visualize Agrippa's Pantheon with a cella paved in colored marble and covered by a wooden roof illuminated by a central oculus.

Such a reconstruction is consistent with the ideology and typological heritage of the monument. The conception of the vaulted space as an imitation of the starry sky and therefore of the cosmos has precedents dated well before the Augustan period.[45] Cicero mentions the *sphaera* constructed by Posidonius "whose single rotations reproduce the motion of the sun, the moon, and the five wandering stars that occur in the sky every day and every night."[46] The *frigidarium* of the Stabian Baths at Pompeii is a circular structure with a truncated conical roof, central oculus, and walls frescoed with garden motifs.[47] The vault was frescoed with gold stars on a blue background in imitation of a night sky.[48] At the Pompeian baths, ancient visitors found themselves in an ideal setting, a garden under a starry vault with a central eye permitting a stream of natural light. Although the structure may be tiny by comparison with the Pantheon, the issue of scale does not invalidate the iconographic relationship, nor is it an isolated example. A circular aedicule with a star-studded, domed vault also appears in

Pompeii in the third-style wall decoration of one of the rooms of the House of Caecilius Jucundus.[49] In the ancient world, vaults often allude to this simple symbolic message: the starry sky is like a canopy, ceiling, or vault.[50] In the passage introduced at the beginning of this chapter, Dio describes the dome of the Pantheon as a symbolic representation of the heavens. An echo of such associations remains in late-antique literature as well.[51]

A New Parallel: Chester

An additional comparison comes from an interesting structure discovered at the Roman military base of Chester, England, datable to the Domitianic period.[52] There, an elliptically planned timber-roofed building (Fig. 2.10 a, b) was composed of 12 radiating chapel-like spaces that faced inward onto a colonnaded portico that supported an attic with sculptural decoration. At the heart of the plan there was a small central open-air space where a fountain was placed. Prompted by the 12-part subdivision of internal space, investigators have proposed a polyvalent religious character for the site. This was likely a celebration of the lineage of Augustus in the company of the gods – including Augustus and Caesar – but perhaps also a physical and symbolic image of the world.[53] The overall length of the elliptical building, around 40 meters, is comparable to the internal diameter of the Pantheon, and one might ask if Agrippa's project could have taken a similar form: not a simple annular ring, then, but a series of monumental "chapels" that faced a porticoed colonnade encircling a space open to the sky via an opaion. Hypothetically, where decorative roundels (*clipei)* may have been placed on the attic at Chester in imitation of similar features in the Forum of Augustus, the caryatids of Diogenes of Athens could have found their place in Agrippa's Pantheon.



2.10. Plan (a) and model (b) of ancient elliptical building excavated in Chester, England. (Computer reconstructions by Julian Baum in an update of Mason 2000)

Symbolism and the *ascensio ad astra* of Romulus

As previously mentioned, the site of the Pantheon was associated by tradition with the apotheosis of Romulus, the first king of Rome, and as such, it served as a model for the future *consecrationes* of later Roman emperors. The fact that Dio Cassius interpreted the cupola of the actual building as a symbolic representation of the heavens is pertinent in this regard. Such symbolism had diverse manifestations. In one sense, it was expressed through the perfection ofmathematical relationships, in particular through the proportions of the interior. As Giangiacomo Martines explains in his chapter, these proportions correspond uncannily to Archimedes' proposition relative to the properties of the sphere and of the cylinder since the measures of the drum and the cupola coincide (Plate XII).[54] Although the hypotheses that envision the rotunda as a sort of solar clock,[55] or microcosmic image of the world,[56] are perhaps too ambitious for the evidence, it is clear that the dome evoked the vault of the heavens. Moreover, the central opaion left open as the passage between earth and sky evokes an essential element in the process of apotheosis. Gilded bronze stars placed in the coffers of the dome may have accentuated the celestial symbolism.[57] The sun's rays enter through the opaion and, due to the effect of the rotation of the earth, illuminate the walls of the rotunda, its exedrae, and its aedicules in constantly changing ways (Plate IX). These are perhaps the fundamental elements that distinguish the Hadrianic Pantheon from related buildings.

IX. Dome and oculus. (The Bern Digital Pantheon Project)

Thus, the luminous ray of light directed toward and shining through the entrance under the sign of Torus and of the Virgin does not privilege the dates of the equinoxes (when the light falls on the zone between dome and the main order), but rather, like the orientation of the Ara Pacis, the birth date of Rome, April 21. On that date, exactly at midday, the stream of light from the opaion is centered on the entrance bay of the temple. It is as if, at precisely this moment, the emperor had entered the Pantheon illuminated by the sun as a reflection of this calculated arrangement. Like the Augustan obelisk at

Campo Marzio, the Pantheon also had a strong solar association and, like the Ara Pacis, a special symbolic relationship with the date of Rome's foundation. The movement of the sun thus exalts the connection between Romulus, first founder of the city, whose apotheosis the Pantheon celebrates, and Augustus, the new Romulus and second founder of the Urbs after decades of civil war.

Of further possible relevance to the temple's ideological program is the recurrence of the number 7, as in the number of exedrae in the rotunda, and its multiple 28, which is the number of coffers in each ring of the dome.[58]Theodor Mommsen thought that the seven exedrae were occupied by statues of the seven planetary divinities.[59] This theory poses some difficulty in the choice and placement of these gods, for there were other deities to take into account, including Romulus/Quirinus, the divine Caesar, and perhaps Apollo and Diana in their incarnations of Sol and Luna.[60]

There remains the problem of determining how much of this subtle program was understood by ancient visitors. Were they aware of the complexity of the mathematical formulas, or the symbolism embodied in the numbers 7 and 28? I don't believe so.[61] Visitors instantly sensed the harmony of the space, as we do today at a distance of roughly two thousand years, having grown up with comparable images from the time of the Renaissance. The starry vault, the great hole in the dome, the apses, the aedicules, and the niches in the walls with the statues of divinities were all probably taken in without much recognition of the architect's mathematical concerns. Visitors would no doubt have wondered about the significance of the sunbeam that moved along the walls and washed the niches and their sculptures with dramatic effect. Only subsequently, perhaps with the help of experts or local guides, would ancient visitors have sought to reconcile the number of the niches and the distribution of divinities with a familiar belief, or scheme, or programmatic logic.

It seems to me that one of the most significant elements for the ancient visitors' cognition of the Pantheon at a semiological level is a scheme that follows the rules of a *templum* on a circular plan. More precisely, with its division into 16 segments (seven exedrae plus eight niches plus the entrance), the plan imitates the celestial templum according to the rules of Etruscan learning, the *disciplina Etrusca*, as transplanted into Roman religion, and the well-attested distribution of the gods in the sixteen regions of the celestial templum.[62] Not all visitors would have appreciated the complex system that must have suggested the scheme, but certainly they would have learned some of the essential ideas of it. Perhaps the statues of the gods would have roused dormant memories and rendered comprehensible the otherwise complicated figural program. The distribution of the statues might even have reconciled the number 7 with the more or less canonical distribution of the gods in the 16 regions of the heavens.[63] It is even conceivable that the luminous solar beam streaming through the opaion was intended to fall on the divine statues on their principal festival days.[64] If it did not, the potential for such an effect remained as appealing for the ancients as it does for present-day visitors.

Agrippa's Pantheon: Greek or Roman?

Dio referred to the possibility of naming the edifice after the emperor. Just as the Greek term *Augousteion* refers to the divinized Augustus honored in a manner consistent with Hellenistic tradition, so too Dio's Pantheion implies an association of divinized mortals with the Olympian gods. The most accurate interpretation of the term *Pantheion* can be deduced from an inscription on one of the altars in the sanctuary of Demeter at Pergamon,[65] which points to a translation as "temple of all

the gods" rather than simply "extremely sacred." Both the cult of the 12 gods and the cult of all the gods operated as flexible systems, subject to local variations.[66] In the religious attitudes behind these cults, there is a certain liberty that contrasts with traditional cults, which typically could not be altered without loss of civic identity.

Just as a new *divus*, King Eumenes II, was included among the 12 Olympian gods in Pergamon Julius Caesar would become the first mortal to be celebrated among all the gods in Rome. In both cases, these were probably only specific moments in the evolution of more complex forms of dynastic cults that extended to other members of the family. There is, in addition, a "cosmic" valence that should also be taken into account, as is evident in the figural program of the Great Altar of Zeus, where the battle between the gods and giants involves earth, sea, and sky. Symptomatic of a general trend, rulers play superhuman roles in the gods' scheme for bringing peace and prosperity back to the world, along with an equilibrium between cosmic and terrestrial forces.

In this context, Edmund Thomas has correctly associated the Pantheon's program with that realized by Antiochus I of Commagene (c. 86–36 BC) in the construction of the *hierothesion* on Mount Nemrut (Nemrud Dağ, a UNESCO World Heritage Site in modern Turkey).[67] The hierothesion, a religious sanctuary, is simultaneously Antiochus's tomb, a cult site to him and his ancestors, and also a sanctuary of all the gods.[68] On the summit of the mountain, the sovereign constructed two enormous terraces, from which five divinities on thrones dominate the landscape. Four of them are syncretistic divinities of the Greco-Persian pantheon, while the fifth divinity is Antiochus himself, co-opted among the gods.[69] We know that he wanted his tomb, hence his body, buried in close proximity to the gods, some of whom were planetary deities. In Rome, the Pantheon was perhaps dedicated to an analogous goal. Although the morphology of these buildings may not be comparable, it is also true that a cult of all the gods or of the 12 gods did not require a predetermined spatial configuration. Indeed the commonly accepted premise of a circular space as indicative of function as well as typology is misfounded.[70] Thus, in spite of obvious differences, the important link between the ideological forms adopted by a Greek ruler and the nascent Augustan principate should not be underestimated.

Andreas Grüner has argued that Agrippa's Pantheon was not a sacred building, but a sacred enclosure comparable less to Greek structures than to a tradition of Roman open-air (hypaethral) and centrally planned temples.[71] The fundamentally Roman aspect of the project and the limited nature of comparisons with Greek buildings are not in question. Nevertheless, it cannot be a question of strictly Roman characteristics, for the very name Pantheon reveals decisive Greek connections. The case of the Tychaion of Alexandria seems to confirm those links.

The Tychaion of Alexandria

As with the Mausoleum of Augustus, parallels in the architecture and topography of Alexandria have also been cautiously advanced for the Pantheon.[72] The most significant example is a structure dedicated to Tyche, goddess of fortune or prosperity, cited only in late antique documents, the earliest of which is from the fourth century AD.[73] The monument apparently stood in the area of the royal palaces, by the side of the canal also called Tychaion that flowed toward the center of the city.[74] The monument was described in detail in one of the *ekphraseis* collected under the name of Libanus of

Antioch (AD 314–393), even if not by his hand.[75] The text by the Pseudo-Libanus is complicated and ambiguous:

> An enclosure is placed in the middle of the city, dedicated to many divinities, but on the whole it is said to be of Tyche.... The place is formed as follows: the whole is artistically elaborated from the pavement to the ceiling; the building is articulated by semicircular niches, before each of which are placed columns of various kinds. The niches were built for the exhibition of works of art, and it is possible to enumerate the niches instead of the statues; between the statues rise columns. There are not statues of all the gods, but of twelve. And a high point emphasizes the position of the founder relative to the other heights and their positions; the statue has the appearance of the Soter [royal savior] and holds that through which the city is usually nourished. And Charis stresses the nature of the earth; she is encircled by half of the statues of the gods, according to their number. Exactly at the center is placed a sculptural group depicting Tyche, who through a crown gives notice of Alexander's victory. And Tyche crowns Gaia, who in her turn crowns the winner. Victories are at Tyche's sides and through them the artist has emphasized well Tyche's power, as Tyche knows all of victory. Thus the appearance of the place culminates in the laurel crown that is held by the statue. And one high on a seat discusses philosophy, another is nude and bears in the left hand an image of the heavens, but the right is held over all; nude, without clothes, he is represented as such. And bronze stelai, on which are inscribed the laws of the city, are inside on the pavement. And inside there are doors that lead to the sacred enclosure of the Muses. Kings of bronze are inside, not all those that follow one another in time, but only the most renowned of them.[76]

From this passage we may draw several facts and inferences: Although it survived until the seventh century,[77] the Tychaion must be dated to the Hellenistic period because its center was occupied by a representation of Alexander the Great without any reference to Roman emperors. Semicircular exedrae housed statues of the 12 as-yet-unidentified gods.[78] On a high point of the structure, (a high plinth, or the top of a column?), the statue of an unidentified Soter (a title associated with the Ptolemaic kings of Egypt meaning literally: savior, deliverer) held an attribute connected to fecundity.[79] A statue of Charis (embodiment of grace, kindness) was surrounded by six divinities, and there was a complex sculptural group composed of Tyche, flanked by Victories, who crowned Gaia (mother earth), who in turn crowned the only mortal clearly identified, Alexander the Great.[80] The location of these sculptures, like those of the unidentified kings, is a matter of conjecture. The location of bronze stelai inscribed with civic laws on the pavement of the sanctuary is equally unclear.

It is nonetheless evident that the Tychaion was a covered building of religious purpose with a variety of imagery.[81] Its dedication to Tyche and the cult of the 12 gods must have been related in some way to Alexander and the unidentified Soter, both of whom are mentioned in the description. The other unamed kings mentioned were perhaps added over the course of time. Relevant to the Pantheon is the program of the Tychaion, possibly a circular building with exedras/apses containing statues of gods and of the sovereigns who bore comparison with them. The alliance of the gods and the sovereigns with political functions emerges from the presence of the civic laws inscribed on the stele of the interior.

The Pantheon as a Place of *consecratio* and of Imperial Veneration

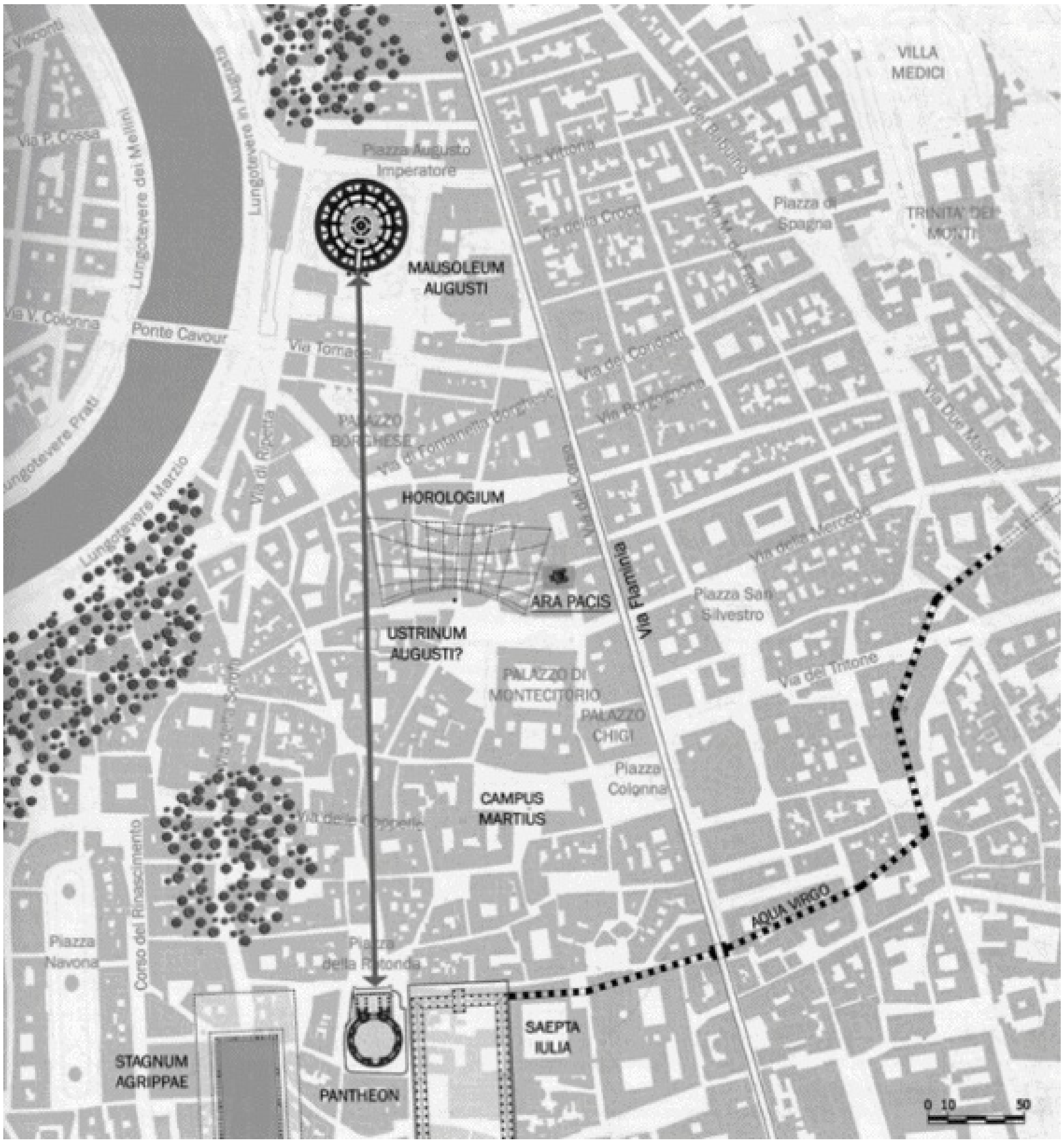
Evidence for the north-facing orientation of the Pantheon of Agrippa and its similarity in plan to the present building are key elements in the interpretation of the monument and the role it played in the ideological program underlying the monumentalization of the central Campus Martius. The choice of the site can be related to the legend of the disappearance of Romulus.[82] According to one version of events, the heavenly ascension of Rome's founder occurred during a military review in a place originally called Ovile, the enclosed area for voting that was later replaced by the Saepta Iulia, not far from the palus Caprae.[83] The whole area was subsequently transformed by Caesar and then Agrippa and Augustus. As a result, the marshy palus caprae was transformed into the elegant stagnum Agrippae, Agrippa's vast artificial lake. Over time, the Saepta lost its original civic and military functions, becoming a market square and a place of diversion for idlers.[84] Thus, the proximity of the Pantheon appears to hark back to mythical events associated with the very origins of Rome itself. Indeed, the reprise of the plan of the Hadrianic Pantheon in many later centrally planned mausoleums with porches, which cannot be accidental, perhaps represented a cultured reference specifically to the first Roman assumed among the gods and, more generally, the prospect of postmortem divinization.[85] The right to be buried in the Campus Martius was conceded to several illustrious men by decree of the senate and at public expense for analogous symbolic reasons. Later, the northern area of the Campus Martius directly in front of the Pantheon would become sites for altars consecrated to subsequent Roman emperors.[86]

In topographical context, therefore, it would seem that the Pantheon operated as the focal point for an innovative religious system. It was a place of veneration of the principal Olympian divinities (probably including Romulus/Quirinus), along with the first divinized member of the gens Iulia, Julius Caesar. Judiciously, Augustus himself must have rejected the idea of presuming this honor while still alive, preferring to have his statue placed with that of Agrippa in the porch of the temple while no doubt awaiting his turn to move into the temple proper. The Pantheon was thus born with historical and dynastic functions, assimilating episodes, observances, and associative topographical values that had not previously been coherently linked: the apotheosis of Romulus; the presence of tombs of illustrious men honored by service to the Republic; the sanctification of Julius Caesar, with its echoes of the death and divinization of Romulus;[87] and the future apotheosis of Augustus, the new Romulus by virtue of founding a new Rome, and thus heir to his immediate and distant forebears.

The eagle holding a crown of oak in its talons that decorated the pediment of the Pantheon, according to the interpretation of the fastening holes by Lucas Cozza, recalled the moment recounted by Suetonius (Vita Augusti 97) when a real eagle landed on the tympanum of the temple, the portent that had augured the death and divinization of Augustus (Plate XVII).[88] The oculus in the dome presented that union of earth and sky that symbolized an apotheosis into the heavens. The space to the north of the Pantheon, which the pediment overlooked, was later occupied by the Temples of Matidia and Hadrian and the altars of imperial *consecratio* destined for the massive funerary pyres of deceased emperors. The symbolic ritual that took place for these occasions is well known: The pyre was lit and when the flames reached the summit, they consumed the knots that held an eagle imprisoned in a cage. The eagle, finally free, flew off carrying with its mighty wings the divine aspect of the emperor liberated from his mortal remains.[89]

Connections with the Mausoleum of Augustus

It is in this context that the relationship between the axis of the Pantheon and that of the Mausoleum of Augustus becomes significant (Plate XVI and Fig. 2.11).[90] Because the two monuments were constructed at the same time – the Mausoleum was almost finished in 23 BC, at which time it received the ashes of Marcellus, while the Pantheon was dedicated by Agrippa in 27 or 25 BC – this axial correspondence cannot be accidental. It composes a unified urbanistic project whose functions may have incorporated a proportional relationship, too: The diameter of the Mausoleum is 300 feet at the base, while that of the Pantheon is 150 feet measured around a ring passing through the center of the columns.[91] Previously, Augustus had built the Ara Pacis, the huge sundial (*horologium*), and the imperial altars. The empty space between the Mausoleum and the Pantheon must have further reinforced the link between them. Though restricted by later constructions, this axis seems to have remained as a kind of avenue.



2.11. Axial alignment of the Pantheon and the Mausoleum of Augustus. (Archivio della Sovraintendenza dei Beni Culturali di Roma Capitale)

The ideological and visual relationship with his family's mausoleum would have complemented a

monument celebrating Augustus the ruler and his divine associations after the fashion of Hellenistic precedents. Initially, the dynastic intent was expressed somewhat ambiguously, since Augustus's power at this stage was still not entirely consolidated. These circumstances may explain why only faint traces of this function survive in literary sources,[92] and why, by the Severan period, the precise sense of its name was no longer generally understood. According to Dio Cassius, as we have seen, it was called Pantheon "probably" because it held the images of many gods, but for him "the main reason" for the name lay in the fact that the dome fully represented the heavens.[93] More than a century afterward, in a visit to Rome in AD 357, Constantius II could still admire the Pantheon as a lofty vaulted space.[94] Ammianus Marcellinus, in recounting Constantius II's visit, does not mention statues of the gods, but only those of the emperors that had come to populate the rotunda. Presumably they occupied the aedicules and the niches, perhaps at the expense of some of the original, divine occupants. The Pantheon had evidently become definitively connected with the Roman emperors, its capacious vault symbolic of their dominion over a vast tract of the earth's surface.

I would like to thank Karen Lloyd for her translation and Mark Wilson Jones for editorial suggestions. This research was completed in the summer of 2008. Since it has not been possible to review the text and notes on the basis of more recent references, I refer the reader to my article "Augustus' Solar Meridian and the Augustan Program in the Northern Campus Martius: Attempt at a Holistic View," *Journal of Roman Archaeology*, supplementary ser. 99, 2014, for updates, revisions, and bibliographic additions.

1 J. M. Roddaz, "Marcus Agrippa," *Bibliothèque des Écoles Françaises d'Athènes et de Rome 253*, Rome 1984, pp. 252–277; Dio Cassius (LIII, 27) (trans. as *Dio Cassius: Roman History*, by Earnest Cary and Herbert Foster, Cambridge 1917). The dedicatory inscription dates the completion of the building to 27 BC (CIL [Corpus Inscriptionum Latinarum, ed. Matthaeus della Corte, Berlin 1970], vol. 6, 896), while Dio's passage suggests 25 BC.

2 The fire of AD 80 was said to have burned the Serapeum and the Iseum, the Saepta, the Poseidonion, the Baths of Agrippa, the Pantheon, the Diribitorium, the Theatre of Balbus, the stage of the Theatre of Pompey, the Portico of Octavia, and the Temple of Jupiter Capitolinus with the surrounding buildings (Dio Cassius, 66.24, 2). Domitian assumed power in AD 81 and a reconstruction of the Pantheon is commonly attributed to him (Eusebius of Caesarea, *Chronicon*, 3d century BC, ed. Alfred Schoene, Berlin 1866, a. 354, 146; Hieronymus, *Chronicum Eusebii ab Hieronymo retractatum ad annum Abrahae* 2395, 2105 (Malcolm Drew Donalson, *A Translation of Jerome's Chronicon with Historical Commentary*, Lewiston 1996), but this is doubtful, as we shall see.

3 Paulus Orosius, "Pantheum Romae fulmine concrematum," *Historiae adversum paganos*, 5th century AD, ed. Zangemeister, Leipzig 1889, vol. 7, p. 12; Hieronymus, Chronicum Eusebii ab Hieronymo retractatum ad annum Abrahae 2395, 2127 (Donalson 1996). Hadrian's restoration:

Historia Augusta, Hadrianus, 19. Elsewhere in the *Historia Augusta*, however, the dedication is attributed to Antoninus Pius (*Historia Augusta*, Antonius Pius, 8). In this venue I will not go into the question of the paternity of the "new" Pantheon, namely, whether it was begun in the time of Trajan and designed by Apollodorus of Damascus, but according to custom will refer only to a "Hadrianic" Pantheon. For this debate, see Wolf-Dieter Heilmeyer, "Apollodorus von Damaskus – der Architekt des Pantheon," *Jahrbuch des Deutschen Archäologischen Instituts* 90, 1975, pp. 316–347; Mark Wilson Jones, *Principles of Roman Architecture*, New Haven 2000, pp. 192 ff.; A. Viscogliosi, "Il Pantheon e Apollodoro di Damasco," *Tra Damasco e Roma: L'architettura di Apollodoro nella cultura classica*, ed. Festa Farina et al., Rome 2001, pp. 156–161; Hetland's chapter in this volume.

4 Translation by Cary and Foster 1917. On terminology: Hugo Hepding, "Die Arbeiten zu Pergamum 1904–1905, Die Inschriften 2," *Mitteilungen des Deutschen Archäologischen Instituts Römische Abteilung* 32, 1907, pp. 241–414; Adolf Engeli, *Die Oratio Variata bei Pausanias*, Berlin 1907; A. D. Nock, "Synnaos Theos," *Harvard Studies in Classical Philology*, 41, 1930, p. 3, note 5, p. 23; Nock, *Essays on Religion and the Ancient World*, vol. 1, ed. Zeph Stewert, Cambridge 1972, p. 204, note 5; p. 218 ff.; L. Robert, "Recherches épigraphiques, VII: Décret de la Confédération lycienne à Corinthe," *Revue des études anciennes* 62, 1960, pp. 324–342; p. 317; L. Robert, *Opera minora selecta. Epigraphie et antiquités grecques*, Amsterdam 1969, vol. 2, p. 833, note 1.

5 They are also interpreted as such by Thomas Pekáry, *Das römische Kaiserbildnis im Staat, Kult, und Gesellschaft, dargestellt anhand den Schriftquellen,* Berlin 1985, p. 57.

6 Nock 1930; Nock 1972.

7 Lacking sons, the dictator had, in his will, adopted Gaius Octavius, son of his niece Atia and of Gaius Octavius, a figure of equestrian rank.

8 Adam Ziolkowski ("Was Agrippa's Pantheon the Temple of Mars in Campo?" *Papers of the British School at Rome* 62, 1994, pp. 267–282) considers the term *Pantheon* to be a nickname, and that the building was originally a temple dedicated to Mars. This does not seem convincing, however, since his theories presume that Agrippa's building was T-shaped and faced south, an idea now discredited. It is also unclear by what mechanism a temple dedicated to Mars was then rededicated to all the gods in the space of a few decades. The most reliable proof of the use of the name Pantheum comes from the Acta fratrum Arvalium of AD January 58 and January 59 (CIL, vol. VI, 2041, l. 50; John Scheid, Paola Tassini, and Jörg Rüpke, *Recherches archéologiques à la Magliana. Commentarii Fratrum Arvalium qui supersunt. Les copies épigraphiques des protocoles annuels de la confrérie arvale (21 av.–304 ap. J.-C.)*, Rome 1998, p. 63, n. 26, line 23 (AD January 11, 58); p. 67, n. 27, line 50 (AD January 12, 59). See also the commentary of WilhelmHenzen, *Nuovi frammenti degli atti dei fratelli arvali*, Rome 1867, p. 258; Henzen, "Eine Neue Arvaltafel," *Hermes* 2, 1867, pp. 37–55. The same name also appears in Pliny the Elder's *Naturalis Historia* (trans. H. Rackham, Cambridge 1952), 9, 121; 34, 13; 36, 38, at a date which preceded the eruption

of Vesuvius in AD 79, when Pliny met his death.

9 Varro, *Rerum rusticarum*, III, 2; Cicero, *Epistulae ad Atticum*, I, 33; Livy, *Ab Urbe Condita* XXVI, 22, 11. See also Kjeld De Fine Licht, *The Rotunda in Rome: A Study of Hadrian's Pantheon*, Copenhagen 1968, pp.191 ff.; Filippo Coarelli, "Il Pantheon, l'apoteosi di Augusto e l'apoteosi di Romolo," *Città e architettura nella Roma imperiale, Analecta Romana Instituti Danici* 10, 1983, pp. 41–46 (updated in Coarelli, *Il Campo Marzio: dalle origini alla fine della reppublica*, Rome 1997, 195); Ferdinando Castagnoli, *Topografia antica*, Rome 1993, p. 251.

10 Luca Beltrami, *Il Pantheon: La struttura organica della cupola e del sottostante tamburo, le fondazioni della rotonda, dell' avancorpo, e del portico, avanzi degli edifici anteriori alle costruzioni adrianee. Relazione delle indagini eseguite dal R. Ministero della Pubblica Istruzione negli anni 1892–93, coi rilievi e disegni dell' architetto Pier Olinto Armanini*, Milan 1898; Luca Beltrami, *Il Pantheon rivendicato ad Adriano 117–138 d.C.*, Milan 1929. For Chedanne, see William C. Loerke, "Georges Chedanne and the Pantheon: A Beaux Arts Contribution to the History of Roman Architecture," *Modulus*, 1982, pp. 40–55, some of whose plans are published in *Roma Antiqua: "Envois" degli architetti francesi (1786–1901). Grandi edifici pubblici*, exhib. cat., Rome 1992, pp. 124 ff., nos. 71–76.

11 Pier Olinto Armanini's plan, published in Beltrami 1898, Fig. XXV, formed the basis for later reconstructions that erroneously give the building a south-facing facade: Rodolfo Lanciani, *Rovine e scavi di Roma*, Rome 1897, Fig. 185; Armin von Gerkan, "Das Pantheon im Rom," *Von antiker Architektur und Topographie* 60, 1959, pp. 273–277, Fig. 1; Heinz Kähler, *Der Römische Tempel*, Berlin 1970, Fig. 9; Doris Gruben and Gottfried Gruben, "Die Türe des Pantheon," *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung* 104, 1997, pp. 3–74, Fig. 29.

12 Antonio Maria Colini and Italo Gismondi, "Contributo allo studio del Pantheon: La parte frontale dell'avancorpo e la data del portico," *Bullettino della Commissione Archeologica Comunale di Roma* 44, 1926, pp. 67–92. See specifically pp. 87 ff.

13 Beltrami 1898, p. 45, Figs. X–XIII; Lanciani 1897, p. 482.

14 Beltrami 1898, pp. 38 ff., Figs. VIII, XXXIV; Beltrami 1929, pp. 52–53, Plate XVI; Licht 1968, pp. 172 ff., Fig. 193; Paola Virgili and Paola Battistelli, "Indagini in piazza della Rotonda e sulla fronte del Pantheon," *Bullettino della Commissione Archeologica Comunale di Roma* 100, 1999, pp. 137–154, note 33. Lanciani also mentions slabs of giallo antico, without citing evidence.

15 Beltrami 1898, p. 39. In the gallery toward the south, he states, "the impressions are present at a distance greater to those already noted (namely, in the eastern arm of the tunnel)," while in that

toward the north was "found another fragment of marble still in place"; finally, in the western gallery were "discovered impressions of seams of a marble pavement at a greater distance." Cf. Licht 1968, p. 175, Fig. 193; Virgili and Battistelli 1999, p. 140, Fig. 2.

16 The bed was made up of "stratifications of fluvial clay, of which the deepest was very compact and bluish-grey": Beltrami 1898, pp. 37 ff., Fig. XXXIV (our Plate XX); Beltrami 1929, p. 62, Plate XVI; Gruben and Gruben 1997, p. 59, Fig. 30 a; Virgili and Battistelli 1999, Fig. 4, H–I.

17 Beltrami 1898, pp. 38, 54 note 1, 72 ff.; Lanciani 1897, p. 482. Edmund Thomas, "The Architectural History of the Pantheon in Rome from Agrippa to Septimius Severus via Hadrian," *Hephaistos* 15, 1997, p. 169.

18 Lanciani 1897, pp. 482 ff., Fig. 185; Beltrami 1898, pp. 64 ff., Figs. XXV, XXVI (where the wall is marked with the letter c), XXIX, XXX (where the same wall is marked with the letter D); Beltrami 1929, pp. 62 ff., Plate XVI; Loerke 1982, p. 47, Fig. 8; E. Tortorici, "L'attività edilizia di Agrippa a Roma," *Il bimillenario di Agrippa*, Genoa 1990, pp. 38, 40, Fig. 10; Gruben and Gruben 1997, pp. 60 ff., Figs. 29, 30; Thomas 1997, pp. 168 ff. For doubts about dating this wall solely on the building technique, and in the absence of photographic documentation and stratigraphical data, see Virgili and Battistelli 1999, p. 148, note 42. It may also be noted that reticulate masonry was still used in several walls of Hadrian's Villa. It is also true, however, that the rounded top of the wall appears in many funerary enclosures of the late-Republican and Julio-Claudian periods, but is virtually unknown later, which makes an earlier, Agrippan, date more likely.

19 G. Lugli, *La tecnica edilizia romana*, Rome 1957, pp. 13 ff.; William C. Loerke, "A Rereading of the Interior Elevation of Hadrian's Rotunda," *Journal of the Society of Architectural Historians* 49, 1990, pp. 22–43; Loerke 1982; Tortorici 1990, pp. 28 ff.; Thomas 1997; Gruben and Gruben 1997; Wilson Jones 2000, pp. 180–182; Gerd Heene, *Baustelle Pantheon: Planung, Konstruktion, Logistik*, Düsseldorf 2004.

20 Lanciani 1897, pp. 480 ff., Fig. 185. Cf. Licht 1968, p. 177, note 32, Fig. 194; Coarelli 1983, pp. 41 ff.; Castagnoli 1993, pp. 248 ff.; Gruben and Gruben 1997, 59 ff., Fig. 29. Partially flawed interpretations also appear in Thomas 1997, p. 169; Andreas Grüner, "Das Pantheon und seine Vorbilder," *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung* 111, 2004, pp. 495–512. Lanciani's hypothesis of a circular forecourt was amended as a horseshoe-shaped plan by Doris and Gottfried Gruben (1997).

21 Eugenio La Rocca, s.v. "Pantheon (fase pre-adrianea)," in E. M. Steinby., ed., *Lexicon Topographicum Urbis Romae*, Rome 1995–1999, vol. 5, 1999, pp. 280–283; Paola Virgili, s.v. "Pantheon: età adrianea," in Steinby 1995–1999, 5, Rome 1999, pp. 284–285; Virgili and Battistelli 1999. I wish to take this opportunity to pay tribute to the work of Giovanni Joppolo in the service of

archaeology in the city of Rome, and his drawings of exemplary precision and expertise.

22 Virgili and Battistelli 1999, pp. 149 ff., Figs. 1, 3, 4, 6 C and D, 8.

23 Virgili and Battistelli 1999, pp. 142 ff., Figs. 1, 3, 4, 6 A and B, 7.

24 H. Nissen, *Orientation. Studien zur Geschichte der Religion*, vol. 3, 1910, p. 339. Even if only partially correct in his reading of the work of Chedanne and Armanini, Lugli (1957, pp. 13 ff.) also believed that the Agrippan building faced toward the north and that it had a circular covered cella. For partly similar conclusions reached by other means, see Loerke 1982, pp. 47 ff.; Tortorici 1990, pp. 28 ff.; Thomas 1997, pp. 167 ff.; Wilson Jones 2000, p. 182; Heene 2004, pp. 16 ff. Gruben and Gruben (1997, p. 72, note 217) have on the contrary rejected Loerke's hypothesis, arguing among other things that the excavations at the end of the nineteenth century had not turned up traces of older stairs to the north. However, the 1996–1997 excavations in effect vitiated this objection.

25 Loerke 1982, pp. 48 ff. Loerke's reading was based on drawings. Beltrami 1898, Figs. XII, XIV, XV, and XXXIV, aspects of which have been incorporated in the figures here Cf. Tortorici 1990, pp. 36, 38.

26 Loerke (1982, p. 49) proposes a decastyle portico on the basis of an elevation by Chedanne, unfortunately lost, but described by R. Phené Spiers ("Monsieur Chedanne's Drawings of the Pantheon," *Journal of the Royal Institute of British Architects* 2, 1895, p. 180), on the occasion of an exhibition held in London (on which see Loerke 1982, pp. 47, 55). Cf. Thomas 1997, p. 168; Virgili and Battistelli 1999, p. 148 and note 46. The octastyle solution with antae would be the best option according to mathematical coincidences between the pre-Hadrianic and Hadrianic Pantheon intuited by Heene (2004, pp. 17 ff., Figs. 7, 9).

27 Beltrami 1898, p. 54. The difference in level is shown in Ioppolo's north–south section (Virgili and Battistelli 1999, 145 ff., Fig. 4), which partially revises the elevations by Armanini (Fig. 19 b, b', b''). The original podium related to a datum around 9 meters above sea level, which constituted the ground level for the building activity of Agrippa and Augustus in the Campus Martius generally.

28 Thus, there was no change in level to justify a hypothetical set of steps leading up to an imagined south-facing temple. See Lanciani 1897, p. 482; Beltrami 1898, p. 45, Figs. X–XIII.

29 Gruben and Gruben 1997, p. 59.

30 Gruben and Gruben 1997 passim (for the threshold, pp. 31, 54 ff.).

31 For Gruben and Gruben (1997, p. 59) the fire of AD 80 produced only limited damage, giving rise to a reconstruction that entailed an embellishment of the preexisting building: a marble podium and a pavement in precious colored marbles, approximately 1 meter above the Agrippan pavement. Cf. a note by Pier Olinto Armanini (Beltrami 1898, Plate XV), associating a possible raising of the podium with the "level of Domitian."

32 As underlined by Gruben and Gruben (1997, p. 53): "Das stehende Bauwerk ist ohne Zweifel im engsten Sinne der Nachfolger des von Agrippa 27 v. Chr. geweihten Pantheon." They also note (p. 55) that the symbolic ties between the two structures were not confined to the portal.

33 Loerke 1982; Loerke 1990. Cf. D. M. Jacobson, "Hadrianic Architecture and Geometry," *American Journal of Archaeology* 90, no. 1, 1986, p. 84. For a schematic reconstructive drawing based on Loerke's hypothesis, see Heene 2004, p. 16, Fig. 6.

34 Pliny the Elder, *Naturalis Historia*, 36.38. Cf. Gruben and Gruben 1997, pp. 58 ff. and note 155.

35 Similar observations were put forward by Lugli 1957, p. 14, and by Wilson Jones 2000, p. 182.

36 Tortorici 1990, pp. 38, 40.

37 Such walls tend to have a double-sloped or curved top. For those of the tombs of the necropolis of Porta Nocera at Pompeii, see Antonio D'Ambrosio and Stefano De Caro, *Un impegno per Pompeii: Fotopiano e documentazione della necropoli di Porta Nocera*, Milan 1983.

38 Heene 2004, p. 18, Fig. 9; p. 20, Fig. 10. For the mathematical scheme of the Hadrianic Pantheon along with associated formal and conceptual implications, see Mark Wilson Jones 1989b ("Principles of Design in Roman Architecture: The Setting Out of Centralised Buildings," *Papers of the British School at Rome* 57, 1989, pp. 108, 118, 127, Fig. 5, Table 1); Wilson Jones 2000, pp. 184 ff., Fig. 9.11.

39 For similar conclusions, see Tortorici 1990, pp. 40, 42; Loerke 1990; C. J. Simpson, "The Northern Orientation of Agrippa's Pantheon: Additional Considerations," *L'antiquité classique* 66, 1997; Thomas 1997; Wilson Jones 2000, p. 182.

40 Gruben and Gruben 1997.

41 A. Maiuri, "Restauro di una sala termale a Baia," *Bolletino d'arte* 36, 1930, pp. 359–364; Licht

1968, pp. 205 ff., 214, 216, Figs. 206–207; Friedrich Rakob, "Römische Kuppelbauten in Baiae. Die Gewölbeprofile," *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung* 95, 1988, pp. 257–301, Figs. 1–9, Plates 102, 1, 4; 103–107. Friedrich Rakob, "The Vaults of Baia," in *Civiltà dei Campi Flegrei, Atti del Convegno Internazionale*, ed. Marcello Gigante, Naples 1992, pp. 229–258; pp. 237 ff., Plates 5–10. The rotunda at the Sanctuary of Fortuna at Palestrina, undoubtedly older (end of the second century BC), was much smaller, although it did have a dome decorated with coffers and a central oculus. See Friedrich Rakob, "La rotunda a Palestrina," *Urbanistica ed architettura dell'antica Praeneste: Atti del convegno di studi archeologici*, Palestrina 1989, pp. 87–113; Friedrich Rakob, "Die Rotunde in Palestrine: mit einer Bauaufnahme und Rekonstruktion von Mertin Kleibrink," *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung* 97, 1990, pp. 61–92.

42 The roof of the Diribitorium, a building that measured ca. 43 meters in width externally, and which was ca. 120 meters long, was constructed with larch beams 100 feet long and 1.5 feet thick. An evident marvel, one of the unused beams was placed in the Saepta. See M. Torelli, s.v. "Diribitorium" in Steinby 1995–1999, vol. 3, Rome 1997, p. 18; Tortorici 1990, p. 40; M. Pia Muzzioli, "I lavori per la via Nazionale e il Diribitorium," *Rivista dell'Istituto Nazionale di Archeologia e Storia dell'Arte* 18, 1995, pp. 139–167; Coarelli 1997, pp. 155 ff. The central hall of the Basilica Giulia, 30 meters high, measured 75 x 16 meters in the plan and carried a roof made of wooden trusses. See H. Lauter, "Zwei Bemerkungen zur Basilica Julia," *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung* 89, 1982, pp. 447 ff.; C. F. Giuliani and P. Verduchi, s.v. "Basilica Julia," in Steinby 1995–1999, vol. 1, Rome 1995, pp. 177–179.

43 Valentin Kockel, s.v. "Forum Augustum," in Steinby 1995–1999, vol. 1, Rome 1995, pp. 289–295.

44 The outer diameter of the circular foundation is ca. 20.30 meters, and the width of the foundation walls is 2.44 meters. See J. R. McCredie, G. Roux, S. M. Shaw, and J. Kurtich, *Samothrace 7: The Rotunda of Arsinoe*, Princeton 1992; Wolfram Hoepfner, "Zum Arsinoeion auf Samothrake," *Archäologische Anzeiger*, 2001, pp. 467–480. On the wooden roofs of Greek tholoi, see H. Pomtow, *Die grosse Tholos zu Delphi und die Bestimmung der delphischen Rundbauten: eine architekturgeschichtliche Studie*, Leipzig 1912, pp. 216 ff.; H. Thiersch, "Antike Bauten für Musik," *Zeitschrift für Geschichte der Architektur* 2, 1909, pp. 33 ff.; J. Charbonneaux, *Fouilles de Delphes II: Topographie et architecture: le sanctuaire d'Athèna Pronaia*, Paris 1925; J. Charbonneaux, "Tholos et prytanée," *Bulletin de Correspondance Hellénique* 49, 1925; K. Lehmann, "The Dome of Heaven," *Art Bulletin* 27, 1945, pp. 1–27; p. 20.

45 Lehmann 1945.

46 Cicero, *De Natura Deorum*, 88 (ed. and trans. H. Rackham, Cambridge 1933).

47 August Mau, *Pompeji in Leben und Kunst*, Liepzig 1908, p. 196, Fig. 96; Licht 1968, p. 212, Fig. 214; Hans Eschebach, *Die stabianer Thermen in Pompeji*, Berlin 1979, pp. 11, 58 ff., Plates 7 b, 8 a, 41; E. La Rocca and M. and A. de Vos, *Pompeii*, Milan 1994, pp. 308–310 and Fig. a.

48 F. Niccolini, *Le case e i monumenti di Pompeii disegnati e descritti*, Naples 1854–1896, Plates VI–VII; Lehmann 1945, p. 21, Fig. 59; Ida Baldassare, *Pompeii. Pitture e mosaici: la documentazione nell'opera di disegnatori e pittori dei secoli XVIII e XIX*, Rome 1995, p. 418, Fig. 245; M. and A. de Vos, in Eschebach 1979, pp. 85 ff., Plates 66 a–c, 67 a.

49 Lehmann 1945, p. 20, Fig. 58.

50 Robert Eisler, *Weltmantel und Himmelszelt. Religionsgeschichtliche Untersuchungen zur Urgeschichte des antiken Weltbildes*, Munich 1910, passim; Lehmann 1945; E. Baldwin Smith, *The Dome: A Study in the History of Ideas,* Princeton 1950, especially pp. 79 ff.

51 Servius, *Commentarii in Vergilii Aeneidos libros, I*, 505; Eisler 1910, p. 614.

52 David J. P. Mason, *Excavations at Chester, The Elliptical Building: An Image of the Roman World? Excavations in 1939 and 1963–1969*, Chester 2000.

53 Mason 2000, pp. 76 ff.

54 Giangiacomo Martines, "Argomenti di geometria antica a proposito della cupola del Pantheon," *Quaderni dell'Istituto di Storia dell'Architettura* 13, 1989, pp. 3–10; Thomas 1997, pp. 178 ff., Fig. 8; Gerd Sperling, *Das Pantheon in Rom*, Neuried 1999, pp. 25 ff.

55 Frank Granger, "Julius Africanus and the Library of the Pantheon," *Journal of Theological Studies* 34, 1933, pp. 157–161.

56 William Lloyd MacDonald, *The Architecture of the Roman Empire,* vol. 1: *An Introductory Study*, London 1965 (2nd ed. rev. New Haven 1982, p. 120). It was MacDonald who first suggested a reference to heliocentric theories of the universe in the structural conception of the Pantheon (p. 118: "... as the earth rotates, Hadrian's sun-show spins on"), a theory expanded by Sperling 1999, pp. 169 ff. For skepticism, however, see Thomas 1997, pp. 181 ff.

57 Baldwin Smith 1950, p. 91 and note 139.

58 Guglielmo De Angelis d'Ossat, "La forma e la costruzione delle cupole nell'architettura romana," Rome 1938, repr. *Realtà dell'architettura. Apporti alla sua storia 1933–1978*, ed. L. Marcucci et al., Rome 1982, Plate XIX. For more on this theme, see Chapter Four by Martines.

59 The hypothesis, on which Mommsen never wrote anything beyond a citation (Archäologischen Zeitung, Berlin 1867, p. 55), was referred to by Heinrich Nissen (*Antiquarische Untersuchungen*, Berlin 1869, p. 224), and H. Jordan (*Topographie der Stadt Rom im Alterthum*, Berlin 1907, pp. 581 ff., note 61). Cf. S. B. Platner, *A Topographical Dictionary of Ancient Rome*, ed. Thomas Ashby, Oxford 1929, pp. 382 ff.

60 Nissen 1869, p. 224.

61 The choice of 28 for the coffers may also have a compositional logic, as pointed out by Wilson Jones 2000, pp. 191 ff., in order to set up a dynamic interaction with the 16-part radial partition of the ground plan.

62 Nissen's interpretation is stimulating, despite its inaccuracy: "the last and most complete form of the templum is the circle, so also the name urbs is strictly related to orbis and so the building, that visibly represents the order of the world, the Roman Pantheon, will be built as a centrally-planned temple and constructed with a cupola." See Nissen 1869, pp. 150, 219 ff., and 181 ff. for the subdivision of the templum in 16 regions.

63 Nissen 1869, pp. 223–226; Nissen 1910, vol. 3, pp. 339 ff.

64 Thomas 1997, p. 174.

65 Georg Wissowa, *Religion und Kultus der Römer*, Munich 1912, pp. 77 ff., note 7. The inscription is in Friedrich Jacobi, *Pantes Theoi*, Halle 1930, p. 48.

66 The distinction between the cult of the 12 gods and the cult of all the gods was not clear-cut. See G. Ziegler, "Pantheon," *Realencyclopädie der Klassischen Altertumswissenschaft* 18, no. 3, 1949; E. Will, "Dodekathéon et Panthéon," *Bulletin de Correspondance Hellénique* 75, 1951, pp. 233–246. On the cult of all the gods at Pergamum, see Jacobi 1930, pp. 18, 31, 36, 48 ff., 66 ff., 96, 98, 103, 105, 108, 110, 117; E. Ohlemutz, *Die Kulte und Heiligtumer der Gotter in Pergamum*, Darmstadt 1940, pp. 219 ff., 281 ff. On the inscriptions in the sanctuary of Demeter: Jacobi 1930, p. 36, 9 a, b ("basi"); pp. 48 ff., e, f ("are"). Altars dedicated to all of the gods and all of the goddesses were found also in other places in the city, while an important precedent is offered by the case of Philip II and Alexander the Great, each of which was honored as a thirteenth god: Charlotte R. Long, *The Twelve Gods of Greece and Rome*, New York 1987, pp. 207 ff. In a nocturnal procession to

Aigai [present-day Vergina], the statue of the living Philip II, similar to that of a god, was carried together with that of the 12 gods (Diodorus Siculus, *Bibliotheca historica* XVI, 92, 5).

67 Edmund Thomas, "From the Pantheon of the Gods to the Pantheon of Rome," *Pantheons: Transformations of a Monumental Idea*, ed. Richard Wrigley, Aldershot 2004. Cf. Donald H. Sanders, ed., *Nemrud Dagi: The Hierothesion of Antiochus I of Commagene: Results of the American Excavations Directed by Theresa B. Goell*, Winona Lake, Ind., 1996.

68 Sanders 1996, pp. 208–214.

69 Sanders 1996, pp. 133 ff.

70 Will (1951) has also shown to be a fallacy the hypothesis that the cult of the 12 gods (and, by extension, of all the gods) was celebrated nearly exclusively in circular buildings (cf. Ziegler 1949, col. 741 ff.).

71 Grüner 2004, esp. pp. 506 ff.

72 La Rocca 1999, p. 283.

73 Giacomo Lumbroso, "Cenni sull'antica Alessandria tratti dal Pseudo-Callistene," *Annali dell'Istituto di Corrispondenza Archeologica* 47, 1875, pp. 5 ff.; G. Botti, *Plan de la ville d'Alexandrie à l'époque ptolémaïque*, Alexandria 1898, pp. 37 ff.; A. Ausfeld, "Zur Topographie von Alexandria und Pseudokallisthenes," *Rheinisches Museum für Philologie* 55, 1900, p. 367; Aristide Calderini, *Dizionario dei nomi geografici e topografici dell'Egitto greco-romano*, Cairo 1935, p. 155, s.v. "Tychaion"; Achille Adriani, s.v. "Tychaion," *Repertorio d'arte dell'Egitto greco-romano*, Palermo 1966, Serie C, 1–2, pp. 258 ff.; P. Goukowsky, *Essai sur les origins du mythe d'Alexandre (336–270 av. J.C.)*, Nancy 1978, p. 150; Barbara Tkaczow, "Remarques sur la topographie et l'architecture de l'ancienne Alexandrie dans les texts antiques," *Archeologia* 35, 1984, p. 15; P. M. Fraser, *Ptolemaic Alexandria*, Oxford 1972, vol. 1, p. 242, 2, p. 392, note 417; Long 1987, pp. 84 ff., T 24. A., pp. 212 ff., 307 ff.; Andrew Stewart, *Faces of Power: Alexander's Image and Hellenistic Politics*, Berkeley and Oxford 1993, pp. 243 ff., 383 ff.; Gunter Grimm, *Alexandria: Die erste Königsstadt der hellenistischen Welt*, Mainz 1998, p. 70; Elena Ghisellini, *Atene e la corte tolemaica. L'ara con dodekatheon nel Museo Greco-Romano di Alessandria*, Alexandria 1999, pp. 97 ff.

74 Pseudo-Callisthenes I, 31, 4. However, Thomas (2004) opts instead for a location in Antioch, erroneously in my view.

75 Libanius, *Progymnasmata* 12, *Ekphraseis* 25, in R. Foerster, ed., *Libanii Opera VIII*, Leipzig 1915, pp. 438 ff., 529 ff.; Bernhard Hebert, *Spätantike Beschreibung von Kunstwerken. Archäologischer Kommentar zu den Ekphraseis des Libanios und Nikolaus* (Diss. Universität Graz), Graz 1983, pp. 8 ff.

76 My thanks to Emanuele Dettori for his help in the translation and explanation of the text. The building is also mentioned apropos the dramatic events that led to the killing of the Byzantine Emperor Maurice in AD 602. In his account, Simocatta relates that a famous calligrapher, "reaching the zone of the city called Tychaion ... saw the most famous images sliding down from their bases." See Theophylactus Simocatta, *Historia*, ed. Carolus de Boor, Leipzig 1887, vol. 8, 13, 342 B.

77 Besides the event of 602 described by Simocatta, a sixth-century text could refer to the sanctuary: T. D. Néroutsos-Bey, "Inscriptions grecques et latines recueilles dans la ville d'Alexandrie et aux ses environs," *Revue archéologique* 3, no. 9, 1887, p. 203, n. 8. See also Christopher Haas, Alexandria in Late Antiquity: Topography and Social Conflict, Baltimore and London 1997, p. 167.

78 On the 12 gods in Alexandria, see E. Ghisellini 1999, esp. pp. 100 ff. for the sculptures of the Tychaion.

79 As to the precise identity of this ruler, the progenitor of the Ptolemaic dynasty, Ptolemy I, seems more likely than the lackluster Ptolemy X Philometor Soter II.

80 This is the preferred configuration as described by Libanus, and not that offered by Thomas (2004), who thinks that Alexander is crowned by Tyche, who in her turn was crowned by Gaia.

81 Only Stewart 1993, pp. 243 ff., 383 ff., T 95, proposes a building on a square plan. It has also been argued that the structure was an open square with two opposing hemicycles and niches in the walls. Simocatta also refers to a site called Tychaion, a term that could indicate either a building or an open-air sacred precinct (just as at Samos, the term *Heraion* could denote the whole sanctuary of Hera or her temple).

82 Coarelli 1983, pp. 41 ff., esp. p. 45. Cf. Roddaz 1984, pp. 275 ff.; Thomas 1997, pp. 163 ff.; Thomas 2004.

83 For sources see n. 9; Filippo Coarelli, s.v. "Caprae palus," in Steinby 1995–1999, vol. 1, 1993, p. 234. For objections, see Ziolkowski 1994.

84 Statius, *Silvae* 4.5.2; Martialis (Martial) 2.14.5; 57.2; 9.59.1; 10.80.4.

85 On formal and typological affinities between the Pantheon and later mausolea see Wilson Jones 1989b, 108 ff.

86 Coarelli 1997, pp. 591 ff.

87 Angelo Brelich, "Quirinus: una divinità romana alla luce della comparazione storica," *Studi e materiali di storia delle religioni* 31, 1960, pp. 63–119; Andrea Carandini, *Remo e Romolo. Dai rioni dei Quiriti alla città dei Romani (775/750–700/675 a.C.)*, Turin 2006, pp. 299 ff., 467 ff.

88 Licht 1968, pp. 45 ff. (based on the observations of Lucos Cozza); Roddaz 1984, p. 274.

89 Penelope Davies, *Death and the Emperors: Roman Imperial Funerary Monuments from Augustus to Marcus Aurelius*, Cambridge 2000.

90 Nissen 1869, 226. Cf. Ferdinando Castagnoli, "Il Campo Marzio nell'antichità," *Atti dell'Accademia Nazionale dei Lincei,* 1948, pp. 148 ff.; Loerke 1982, p. 51; Loerke 1990, p. 42 and note 47; Thomas 1997, pp. 174 ff., Fig. 6.

91 On the general significance of round dimensions in Roman architecture, see Wilson Jones 1989b.

92 One clue is offered by the information that the college of the fratres Arvales assembled in the Pantheon on AD January 11, 58 and January 12, 59 (see note 8). As this priesthood was concerned with the celebration of the imperial family, it can be deduced that the Pantheon had found service in this connection, at least in the Neronian period.

93 Dio Cassius, 53.27. 2–3.

94 Ammianus Marcellinus, *Rerum gestarum libri*, 4th century AD, ed. J. C. Rolfe, Cambridge 1956 pp. 16, 10, 14: "... velut regionem teretem speciosa celsitudinem fornicatam; elatosque vertices qui scansili suggestu consurgunt, priorum principum imitamenta portantes." The text is, unfortunately, not without interpretive difficulty.

Three New Perspectives on the Dating of the Pantheon

Lise M. Hetland

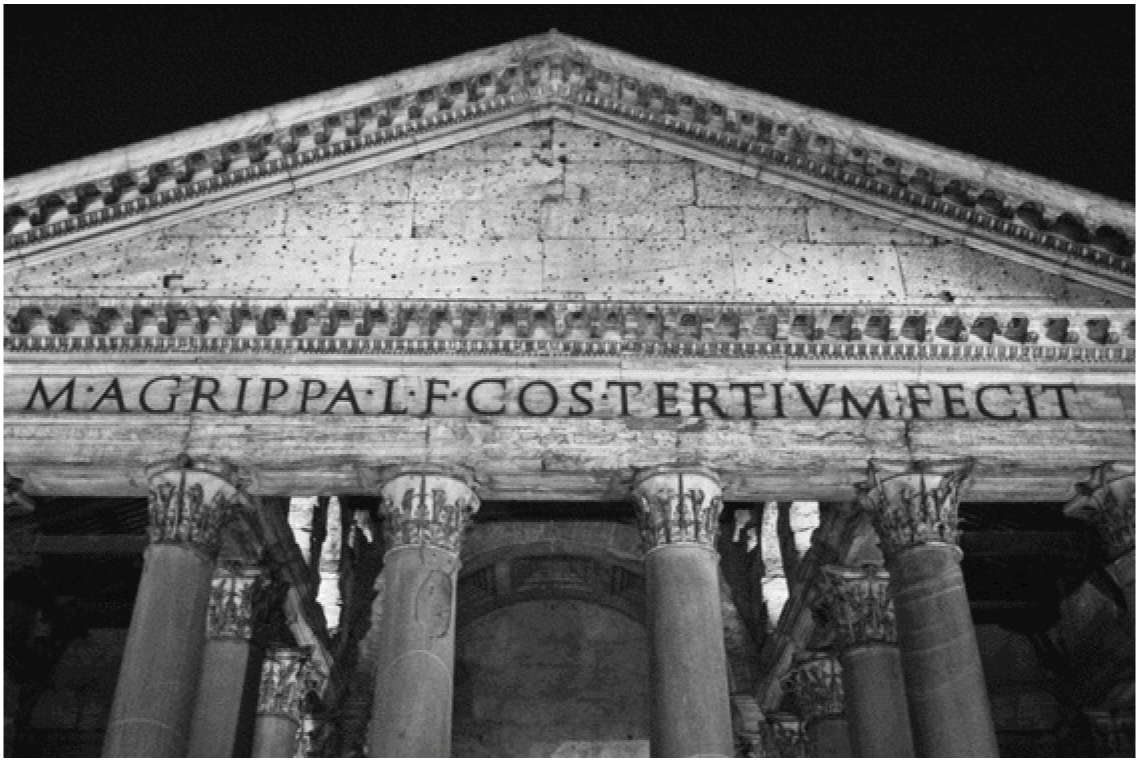
The correct date is the first half of Hadrian's reign. The building was not begun before 117, and probably dedicated about 126–8.... In the body of the Pantheon there is a preponderance of brickstamps of the 120's, and it is upon this fact, more than any other, that the dating of the building is based.

— William L. MacDonald, *The Pantheon*, 1976[1]

1. Problems with Dating the Pantheon

In the opening quotation from one of the most authoritative scholars on Roman architecture, William MacDonald, the Hadrianic dating of the Pantheon is presented as a proven fact. Yet this became the established view only late in the nineteenth century, when scholars turned away from variations on the previously accepted Augustan date.[2] This took at face value the main inscription fronting the portico: M. AGRIPPA. L. F. COS. TERTIVM. FECIT (Fig. 3.1), which seems to claim the building to have been erected by Agrippa in his third consulship (probably in 27 BC).[3] Dio Cassius presumably took the inscription literally when he described the building in the second decade of the third century AD:

> ... in addition [Agrippa] concluded the construction of the building called the Pantheon. ... Agrippa ... wanted then to place there also [a statue of] Augustus and to bestow upon him the honour of having the work named after him; but since the prince did not accept either of these two honours, he had placed in the temple a statue of [Julius] Caesar *pater*, while in the porch he put statues of Augustus and himself.[4]



3.1. View of entablature and tympanum at night. (Courtesy of Fulvio Santus)

In effect, this text harks back to Agrippa's creation of the first Pantheon on the same spot as the present structure. In AD 80, while the emperor Titus was absent in Campania, a fire damaged the whole region around and including the Pantheon. Again it is the Roman consul Dio Cassius who describes the devastations:

> It consumed the temple of Serapis, the temple of Isis, the Saepta, the temple of Neptune, the Baths of Agrippa, the Pantheon, the Diribitorium, the theatre of Balbus, the stage building of Pompey's theatre, the Octavian buildings together with their books, and the temple of Jupiter Capitolinus with its surrounding temples.[5]

The term "consumed" may exaggerate the damage done to the Pantheon itself, in the sense that scant trace has been found of repairs that may be attributed to the reign of the emperor Domitian (see Chapter Two).[6] Another fire, caused by lightning, devastated the building in 110; an ancient source states simply that "The Pantheon was struck by lightning and burned."[7] This time a total rebuilding was required, resulting in the edifice that survives today.

The emperor Hadrian's involvement with the Pantheon is briefly noted in two ancient sources. The first of these, once again by Dio Cassius, informs us:

> He [Hadrian] transacted with the aid of the senate all the important and most urgent business and he held court with the assistance of the foremost men, now in the Palace, now in the Forum or the Pantheon or various other places, always being seated on a tribunal, so that whatever was done was made public.[8]

Written some hundred years after the present Pantheon was built, Dio's *Roman History* does not in

fact connect its rebuilding with Hadrian, since Dio attributes the building to Agrippa, as is clear from the passage by the same author cited earlier.[9] However, the *Scriptores Historiae Augustae* explained "Agrippa's" inscription in another way, as an example of Hadrian's modesty:

> He [Hadrian] built public buildings in all places and without number, but he inscribed his own name on none of them except the temple of his father Trajan. At Rome he restored the Pantheon [*instauravit Pantheum*], the Saepta, the Basilica of Neptune, very many temples, the forum of Augustus, the Baths of Agrippa and dedicated all of them in the names of their original builders.[10]

For more than a century, this statement has been interpreted to mean that the Pantheon was built entirely during Hadrian's reign, from the foundation to the dome. But it is intriguing that this emperor's involvement is described in almost identical terms to the works of repair carried out by his successor, the emperor Antoninus Pius, who, as the *Scriptores Historiae Augustae* states: "... *instauratum ... templum Agrippae*."[11] (These repairs, evidently not that extensive, are confirmed by brickstamps.)[12]

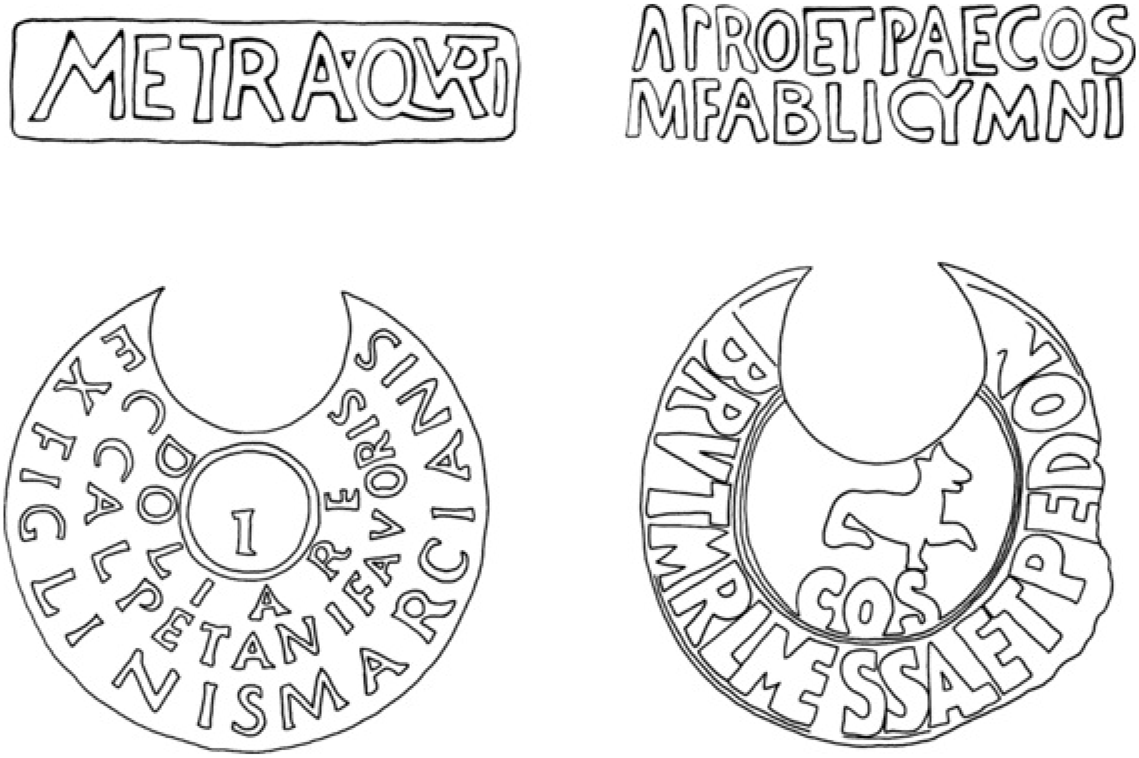
Another inscription, situated on the architrave directly under the more prominent Agrippan one, records repairs carried out by the emperors Septimus Severus and Caracalla, as has also been confirmed by some brickstamps found in the dome and in the intermediate block.[13]

No known ancient source, then, states that the emperor Hadrian was behind the actual construction of the Pantheon. It has been the brickstamps found *in situ* and around the monument that have been taken to indicate the Hadrianic date – yet it is precisely on the evidence of brickstamps that this will now be challenged.

2. Dating Roman Buildings by Brickstamps

A walk in Rome today reveals that bricks were quintessential for Roman Imperial buildings, all the more so since so many of them have been stripped of their marble coverings.[14] A portion of bricks – we do not know the percentage – were imprinted with stamps (Fig. 3.2).[15] These tend to name the owner of the brickworks (often an aristocrat, sometimes even a member of the imperial family), the foreman of the brickworks, very often the name of the operative (usually a slave or a freedman), and the place of production. Such information, frequently heavily abbreviated, could be featured individually or combined, and sometimes accompanied by ornamental symbols. The shape of brickstamps also changed, from the earliest simple rectangular ones used in the first century BC, via the open crescents in vogue toward the end of the first century AD, to crescents that later gradually became more closed, eventually becoming a complete circle during the later empire, when the rectangular-shaped stamps reappear again as well (Fig. 3.3).[16]

3.2. Brickstamp in situ, Caseggiato del Serapide, Ostia, from the Severan period, ca. AD 193–198. The stamp corresponds to CIL XV 371. (Courtesy of Lynne Lancaster)



3.3. Selected brickstamps, counterclockwise from top left: CIL XV 966.7 (first century BC); CIL XV 315 (Trajanic period, from the Pantheon); CIL XV 20 b (AD 115, from the Pantheon), made from the brickworks owned by M. Rutlius Lupus (hence “MRL”), dated by the name of the consuls Messalla and Pedo; CIL XV 801 (AD 123). (Drawings courtesy of Cesare Mecatti, compiled by Georg Herdt)

Dated brickstamps, that is, ones which mention the names of two consuls (who changed every year), are known from as early as 76 BC on a series of bricks from Velia.[17] This was not a geographically isolated case, and dated brickstamps have also been found in other parts of the Italian peninsula, from Bologna in the north to Vibo Valentia in the south.[18] Some time in the second decade of the second century AD, brickmakers in Rome also began to adopt this practice.[19] The year 123 is particularly prolific for brickstamps; about 280 known types cite the consuls in office that year.[20]

One of the first major studies on Roman brickstamps was carried out by Gaetano Marini in the late eighteenth century.[21] But even before this, stamps from the Pantheon had been described in a less scientific manner by figures such as Ottavio Falconieri and Giovan Battista Piranesi (seeFig. 4.7).[22] In a monograph of 1807 on the Pantheon, Carlo Fea concluded that the building was erected by Agrippa, as stated by the inscription, and had later undergone repairs during the reigns of the emperors Domitian, Hadrian, Antoninus Pius, Septimius Severus, and Caracalla.[23] This conception was challenged in 1892 when the French architect Georges Chedanne examined the structures and concluded that the whole building had been constructed in Hadrian’s reign.[24] Later the same year, Lanciani referred to Chedanne’s discovery as if it were already well known: “non si tratta veramente di scoperta, ma di conferma da fatto già conosciuto.”[25] One of the main objectives of the ensuing archaeological excavations, headed by Luca Beltrami in the period 1892–1893, was to check the dating of the rotunda and the portico, and to confirm whether or not the rotunda had been the *laconicum* of Agrippa’s Baths, an idea advanced by Fea and later replicated by Lanciani. Beltrami’s ensuing publication verified that there were no traces of heating that could have supported the

laconicum theory, and more importantly, it concluded that the whole Pantheon was Hadrianic, and sooner or later scholars came to accept this as certain.[26]

Just before these developments, Heinrich Dressel had been conducting the first methodologically based study on Roman brickstamps, which he published in 1891 as the fifteenth volume of the *Corpus Inscriptionum Latinarum* (conventionally abbreviated as CIL XV). In the 1930s and 1940s, his work was further developed by the German scholar Herbert Bloch.[27] Bloch systemized the corpus of dated brickstamps, and then applied them to the chronology of a long list of buildings in Rome and its surroundings.[28] Even if I advance here a different interpretation for the Pantheon to that of Bloch, it remains directly dependent on his method, and on the important discoveries made by him (and by Dressel before him).[29] Bloch's work remains indispensable for the dating of many Roman buildings in Rome, in Ostia, and in Tivoli.

Bloch's extensive research relied on prosopography, the study of the lives of historical figures, in this case the careers of brickmakers, who can sometimes be tracked as their status changed from slaves to foremen, and even to becoming the owners of brickworks. The information condensed in the stamps changed constantly to reflect such changes of status, and consequently individual molds were used for limited periods only. By cross-referencing this kind of information for stamps dated by virtue of the consuls named with other evidence about the buildings in which they were found (ideally, datable inscriptions), Bloch was able to map out a chronology for undated brickstamps. This important work was later supplemented by the researches of scholars such as E. M. Steinby, and more recently by Janet DeLaine.[30]

Fundamental as Bloch's methodology was to the business of dating buildings by means of the brickstamps they may contain, this does not mean that he should never be questioned. In the following pages, I reexamine the basis for dating the initiation of the works on the Pantheon to 118 or 119, near the beginning of Hadrian's reign.[31] Much of the structure of the building is brick-faced concrete (Fig. 3.4), and it is to the stamps on some of its bricks that we now turn.

3.4. Detail of exterior brickwork. (Courtesy of Maxim Atayants)

3. Bloch's Interpretation

The theory of a Hadrianic date for the Pantheon has been left practically unrevised since 1937–1938. Bloch recorded a total of 184 brickstamps in and around the building.[32] Excluding the brickstamps found not in situ or in parts not connected with the Pantheon proper (the so-called eastern wall, most probably part of the neighboring Saepta Julia, the Basilica Neptuni, and all of those found around the building), this still leaves 70 examples.

Just five of these in situ brickstamps bear consular dates. Four of them belong to the years 114, 115 and 116, each of which mentions the same brickmaker, M. Rutilius Lupus. Only one is dated to Hadrian's reign, in particular the prolific year for brickstamps AD 123, as shown in Table 3.1.

Table 3.1. ***Dated brickstamps (consular dates) from the Pantheon***

CIL XV no.	Date	External rotunda	Intermediate block	Total
19 a	114	1		1
20 b	115	2		2
23	116		1	1
549 a	123		1	1

While the consular dated brickstamps represent absolutely dependable evidence for the dating of the building, there are 62 brickstamps that have been dated with reasonable confidence by prosopography to varying time ranges. Of these, 19 brickstamps can be defined within a relatively tight time frame, and all of these are Trajanic/late Trajanic (100–117).[33] A larger group of 39 exemplars have been dated to a broader time range, the late Trajanic/early Hadrianic period (these are also dated by prosopography, but it has not been possible to pinpoint them any more precisely).[34] Then there are 4 brickstamps that have been dated to the Severan period, which can be attributed to the repair works already mentioned. Finally, there are just 3 brickstamps that have not been dated at all (neither by consular dates nor by prosopography), as shown in Table 3.2.

Table 3.2. ***Synopsis of the brickstamps from the Pantheon (rotunda, dome, intermediate block)***

Date	Nos. in situ	% in situ
Trajanic	23	32.9
Late Trajanic/early Hadrianic	39	55.7
Hadrianic	1	1.4
Severan/post-Hadrianic	4	5.7
Undated	3	4.3
TOTAL nos.	**70**	**100.0**

In interpreting this material, a striking pattern emerges. Of the stamps that can be dated to either a relatively tight range or a specific year there is a great preponderance of Trajanic examples (4 + 19, equaling 23).[35] While it is theoretically possible that many of those in the Trajanic/Hadrianic group could tend toward the later period, the fact remains that there is only a single stamp with an absolutely secure Hadrianic date. Obviously, this creates difficulties for the theory of a Hadrianic dating for the Pantheon. Bloch confronted the problem by repeatedly maintaining that the Trajanic bricks should be understood as *vecchie rimanenze dal periodo anteriore* – “old remains from the preceding period.”[36] He argued that the Trajanic brickstamps could represent superfluous material that had been transported to the site of the Pantheon from other earlier projects in Rome, or that had been stockpiled. This may seem to be a satisfactory explanation, and for almost 70 years it has been accepted as such. However, Bloch was evidently concerned that the hypothesis of “old remains” was not an unassailable justification, for he felt obliged to elaborate his explanations further. He did this by focusing on two particular groups of in situ brickstamps.[37] One group comprised the 4 consular

dated brickstamps from the years 114 to 116 made by M. Rutilius Lupus. The other group was made by one Anteros Severianus, the name that occurs on 21 brickstamps.

4. Testing Bloch's Thesis – the "Special" Case of Rutilius Lupus

Bloch assigned the Pantheon to a group of buildings that contained brickstamps made by Rutilius Lupus during the period 114–117 but that were not erected until early in Hadrian's reign.[38] In addition to the Pantheon, this group comprises buildings in Ostia, the so-called Le Quartier des Docks (better known as Portico di Pio), part of the Capitolium Group, the Piccolo Mercato, and Insula I.ii (excluding the Curia), as well as two further buildings in Portus, the Portico di Claudio and the so-called Palazzo Imperiale. In normal circumstances, the presence of numerous bricks stamped with consular dates in the years 114 to 117 would point to a construction date around this time, and so here was a problem for Bloch to negotiate.

That the brickmaker Lupus and M. Rutilius Lupus, the holder of the lucrative office of*praefecti Aegypti* for the period AD 113–117, were one and the same had already been affirmed by other scholars.[39] However, it is Bloch's idea that while he was away in Egypt, his brickworks would have continued to produce bricks for stockpiling, with none (or few) being actually sold. While the identity of this Rutilius Lupus as the "MRL" on the stamps seems practically certain, the second element in Bloch's hypothesis, the stockpiling during his stay in Egypt, has never been proved.[40] It makes little sense from the point of view of economics. Bloch suggested that Rutilius Lupus was speculating in the hope of obtaining higher prices for bricks that had been cured for longer than normal.[41] However, the question of whether any such higher price would have covered the expense of storage, plus a premium for the risk, is left without answer. Bloch assumed that the absence of the emperor Trajan (who was away on a campaign against the Parthians) caused a temporary reduction in building activity in the capital and, moreover, that Rutilius Lupus expected to sell bricks at an inflated price due to increased demand once public building works took off again.[42]

This may seem plausible, but if so, why did the owners of other brickworks not do the same as Rutilius Lupus? In fact, it seems that Bloch's hypothesis was above all created to account for the brickstamps of 114–116 found in situ in the Pantheon, while maintaining his theory that the building only started in 118 or 119.

Bloch's stockpiling theory was endorsed by Axel Böethius, and in particular the claim that bricks cured for a longer period may have obtained higher prices. As support, Boëthius invoked Vitruvius's treatise on Roman architecture, which recommends a prolonged storage period of two years for sun-dried bricks.[43] Vitruvius even reported that the people of Utica only used bricks if they had been stored for five years.[44] It is understandable that sun-dried brick masonry could benefit from seasoning, but it is important to point out that they are structurally different from fired bricks.[45] Once bricks have been fired, prolonged storage will have brought little additional benefit, and besides, there is at least one documented example of bricks being used a very short period, months, not years, after they were made.[46] Through the inscription found on the Serapeum in Ostia, we know that this building was dedicated in AD January 127, yet its fabric contains some brickstamps with the names of the consuls of the year 126 – proving that they must have been used more or less immediately.[47] What is perhaps surprising is that it was Bloch who made the discovery. Even so, he maintained the

benefit to bricks of being seasoned for a long period; he suggests years. The case of the Serapeum should have led him to question his dating of the whole group of "early Hadrianic" buildings, but evidently this was not something he was prepared to do. Instead, he argued that the Serapeum was an extraordinary case.[48]

Bloch went even further in defense of his postponement of the use of bricks made in 114–117 by arguing against the chronological distribution of Rutilius Lupus's bricks in the group of "early Hadrianic" buildings.[49] This is a significant point, since a sequence of utilization that more or less matches a chronological progression of stamps implies the direct take-up of production. On the other hand, the jumbling up of stamps of different dates could mean that earlier bricks awaited the later ones before being put to use. In a recent article on building activity in Ostia in the second century AD, Janet DeLaine has pointed out that there is indeed a chronological distribution of brickstamps in the buildings that Bloch had highlighted.[50] As DeLaine shows, the buildings situated around the so-called Curia, west of the Capitoline, were built sequentially, as indicated by both the building material, that is, dated brickstamps, and the building technique. The first to be completed (after the Curia) was an industrial building (I.ix.2), situated on the northwestern part of the insula. All of the in situ dated brickstamps are from the year 114, with none later, which indicates construction around 114–115. Clearly built up against this structure on the southwestern side is the Caseggiato del Larario (I.ix.3), and this has brickstamps found in situ only from the years 114 and 115, but none from the years before or after; this would be consistent with works being finished no later than 116. No dated brickstamps have been found in situ in the third building, the Casa Basilicale (I.ix.1), but since it is built up against I.ix.3, DeLaine concludes that construction took place around 117–118. She therefore dismisses Bloch's claim that these buildings were all built circa 120. Furthermore, DeLaine has been able to show that another of Bloch's early Hadrianic buildings, the complex commonly known as the Portico di Pio, likewise consisted of several separate bodies of fabric that had been built in distinct phases from 114 onward.

Another of Bloch's early Hadrianic group is the so-called Palazzo Imperiale at Portus. He records 21 brickstamps in situ; of these 11 were made by M. Rutilius Lupus and dated by consular names to the year 115, while others are datable to the years 114 and 116.[51] There is no reason why the construction of the Palazzo Imperiale was not concluded in or around 117, which increases the likelihood that Bloch's early Hadrianic buildings were all built (or were substantially under way) in the last years of Trajan's reign.

There is at least one aspect of Bloch's theory that seems correct, namely, that the Pantheon was contemporary with the group of early Hadrianic buildings that also contain bricks from Rutilius Lupus's works – only these buildings were in fact Trajanic.[52] Thus, this revision of the dates of the buildings at Ostia and Portus to before 118 (Hadrian returned to Rome for the first time as emperor in July of that year) strengthens the case for bringing forward the dating of the Pantheon, too.

5. Another Special Case?

Bloch maintained that the series of brickstamps belonging to the Pantheon and other buildings that mention the brickmaker Anteros Severianus also represents a special group.[53] Those from the Pantheon represent by far the largest group found in situ (CIL XV nos. 811 a–f) in Table 3.3. Twenty-

one brickstamps of this type come from the Pantheon proper (internal and external parts of the rotunda, the dome, and the intermediate block), that is, 30 percent of the total. Bloch assigned the 811 d and 811 f stamps to the second decade of the second century AD (these being frequently used in Trajanic buildings), while the series CIL XV 811 a–c he judged to be Hadrianic because they were found in the Pantheon and in Hadrian's Villa, both of which he believed to have been from this time.

Table 3.3. ***Distribution of brickstamps CIL XV 811 a–f***

CIL XV no.	Trajan's Baths	Trajan's Markets & Forum	Basilica Ulpia	Atrium Vestae	Pantheon
811 a–c					18
811 d	1	12	3		1
811 e			3	1	
811 f	1		5	10	2
811 e or f		6	1		
TOTAL	2	18	12	11	21

It is not in fact possible to be precise about the dates of CIL XV 811 a–c, which could span the late Trajanic and early Hadrianic periods.[54] What is clear, though, is that CIL XV 811d–f are earlier. Here, then, is another group of "problematic brickstamps" for Bloch's dating of the Pantheon to the Hadrianic period, which he again explains as "old remains."[55] Contrary to such a hypothesis is also the fact that the oldest types, CIL XV 811 d–f, have only been found in the lower parts of the Pantheon, which must necessarily have been built before the dome, where instead the types CIL XV 811 a–c are dominant (making up 12 out of the total of 21 brickstamps found). Once again, here is a chronological distribution, which argues against Bloch's stockpiling or old-remains theory in that it points to the progressive release of the bricks to the market.

6. Revising the Date of the Pantheon

The main thrust of the preceding discussion, supplemented by the researches of Steinby and DeLaine is to revise in some respects the dating proposed by Bloch for the Pantheon. The spread of dates for consular brickstamps is summarized in Table 3.1.

This presentation of the facts invert's Bloch's scenario. Instead of 23 problematic Trajanic brickstamps for a Hadrianic dating of the building, this now changes to 1 problematic Hadrianic

brickstamp for a Trajanic dating. This stamp, CIL XV 549, is dated by the consuls named to the year 123, but its location at the junction with the columnar portico suggests that it saw use only after the rest of the building was already complete (see Chapter Seven). By contrast, 23 of all the brickstamps found in situ (or almost 33 percent of the total), may be dated to the reign of the emperor Trajan.[56] This is surely too great a quantity to represent pure accident or old remains, as maintained by Bloch. Neither Bloch nor Steinby have been able to date any more precisely the group of brickstamps attributable to the late Trajanic/early Hadrianic period (39 stamps, or 55 percent of the total of 70 found in situ).[57] It seems that part of this group was assigned to the early Hadrianic period primarily because of being found in the Pantheon, which by these scholars' definition was built at this time – a classic example of circular reasoning.

The analysis of brickstamps from the Pantheon thus shows that it is very problematic to place the start of building as late as 118 or 119. It is this supposed date that made it necessary for Bloch to invent ad hoc hypotheses, and to explain the presence of so many Trajanic brickstamps by recourse to the notion of stockpiling by Rutilius Lupus, or the using up of surpluses from previous years. However, the present investigation suggests a more straightforward explanation – that the Pantheon started under the emperor Trajan. The simplest reason for the presence of brickstamps dated to the years 114–116 in both the rotunda proper and the intermediate block would be that they reflected the time the Pantheon was built.

As noted, many of the same types of brickstamps found in the Pantheon are found in presumably Trajanic buildings in Rome and Ostia. DeLaine's demonstration that the bricks of this kind used at Ostia were not stockpiled but were, rather, brought to market in the normal fashion, and, what is more, in the late Trajanic period, makes it all the more likely that the construction of the Pantheon, too, was begun at this time.

7. What Happened with the Pantheon in the Period 110–118/119?

Let us leave the evidence of brickstamps and look at something else that puzzled Bloch: the interval between the destruction of the previous Pantheon by lightning, an event Jerome's text dates to 110, and the initiation of rebuilding in 118 or 119. Bloch admits that such a long gap is peculiar.[58] However, he fails to realize that this period of inactivity, eight to nine years, is entirely his own creation. The fact is that his theory of a Hadrianic date for the Pantheon creates a void.[59] He imputed the delay to its status as an imperial project, presuming that work could not begin while the emperor Trajan was away, and which upon his death had to await the arrival in Rome of the new emperor Hadrian.[60]

Bloch may also have thought that the rebuilding of the Pantheon could not start immediately after the fire of 110 because many other imperial constructions were being built or finished off around that time. Trajan's major projects include Trajan's Baths (for which the traditional date of inauguration is 109); Trajan's Markets (supposedly finished in 110); Basilica Ulpia (concluded in 112) and Trajan's Forum (substantially concluded in 112, although the works seems to have continued into the Hadrianic period), and the Atrium Vestae (finished in 113).[61] Most of these projects were concluded by 112, and so why would the emperor wait to commence with the Pantheon? It might be thought that preparations for the Parthian wars represented an impediment, but Trajan did not leave the capital to

lead the campaign until September or October 113.[62] And in any case, it is not as if building projects were routinely suspended during military operations.

8. Heilmeyer's Hypothesis

Ancient sources tell us that Apollodorus of Damascus was Trajan's master architect and the designer of important structures, including Trajan's Forum, Trajan's Baths, and an audacious bridge over the River Danube.[63] Many scholars have endorsed this, and have gone on to propose Apollodorus as the author of other buildings constructed during the time of this emperor.[64] Some even argue that Apollodorus was the designer of the Pantheon.[65] One of them is Wolf-Dieter Heilmeyer, who in 1975 argued that the Pantheon was initiated during the reign of the emperor Trajan.[66] Heilmeyer's hypothesis is based chiefly on stylistic evidence, especially the close affinities between the marble encrustation and the Corinthian capitals of the Pantheon and equivalent parts of Trajan's Forum.[67] This interpretation has been challenged most forcefully by appeal to the evidence of brickstamps, as viewed in line with Bloch's analysis. In an article dealing with the dating of the Large Baths of Hadrian's Villa, A. C. G. Smith concluded that brickstamps support the conventional date of the Pantheon to the early years of Hadrian's reign.[68] Yet if the evidence presented here is correct, the validity of such argumentation dissolves. Another objection to the involvement of Apollodorus has been seen to be his supposed execution at Hadrian's behest, an event that Dio Cassius places in the earliest parts of his reign.[69] However, his narrative, as we have seen, is not entirely reliable, and in any case, a Trajanic start for the Pantheon in effect removes this objection, too.[70]

Further parallels between the Pantheon and buildings thought to be associated with Apollodorus are explored elsewhere in this volume by Giangiacomo Martines, Gene Waddell, and Mark Wilson Jones. For myself, the most sustained similarities with the Pantheon are found in the hemicycles in the Baths of Trajan, whether in terms of spatial conception or in details of the composition and decoration (see Figs. 5.2, 5.7). Also comparable with the Pantheon is the articulation of the walls with alternating triangular and rounded pediments, and the coffering of one of the hemicycles that are still standing. The diameter of the largest hemicycles is considerable, and if we imagine putting two of them together, the result may have looked strikingly similar to the Pantheon.

9. Conclusion

Given the sparse information that we possess about Roman architects and their activities, it is surely problematic to name with any confidence the creator of the Pantheon. It is easier perhaps to say who it was not. Dated brickstamps give scant support for the claim that the emperor Hadrian was either its patron or its designer. There is no reason not to take the Trajanic brickstamps found in the Pantheon at face value. We know that it was reconstructed entirely from foundation to dome following the fire of 110, and it now seems probable that the planning of the project started soon afterwards. The site could have been cleared, the materials ordered, and works under way by around 114. Consequently, any influence that Hadrian may have had on the Pantheon must have been limited.[71] The construction of the rotunda may in fact have commenced in the last years of Trajan's reign, in which case it is, of course, to this period that we should assign its conception and design. Being designed and partially

built before 118, the monument really belongs to Trajan's reign, even if it were completed by his successor.

This interpretation of the facts also illustrates the illogicality of the sometimes almost surgically clear-cut presentation of Roman buildings according to the sequence of emperors, and the implied role they might have played in creating successive styles. Relatively abrupt changes or "architectural revolutions," as proposed by some scholars, are also to some degree a result of the modern need for characterization, rather than a description of what actually happened.[72] In reality, the changes that did occur in Roman architecture happened relatively gradually, in response to the varied activities of many different individuals or schools of architects (at times working simultaneously in different directions), rather than being promoted and propelled by one dominant creative force.

The questioning of the dating of the Pantheon presented here will, it is hoped, lead us to question not just our understanding of this specific building but also what we understand by the widespread notion of "Hadrianic architecture."[73] Entrenched "facts," such as the date of the Pantheon and its connection to Hadrian, clearly need reevaluation. Going back over and revising the conclusions of earlier research may appear to be a negative kind of activity, but whenever they are too easily taken for granted it becomes imperative.

A more detailed account is published in Lise Hetland, "Dating the Pantheon," *Journal of Roman Archaeology* 20, pp. 95–112.

1 William L. MacDonald, *The Pantheon: Design, Meaning and Progeny*, Cambridge, Mass., 1976, repr. 2002, p. 13.

2 In a volume summarizing recent conservation work carried out at the Pantheon under the direction of Giovanni Belardi, parts of the present building are still attributed to the Augustan period, although no real arguments are presented to support this supposition (Giovanni Belardi, *Il Pantheon: storia, tecnica, e restauro*, Viterbo 2006).

3 This inscription is usually understood to signify that the Pantheon was built (or dedicated) when Agrippa was consul for the third time, in 27 BC, yet some coins use the legend "M. AGRIPPA. L.F COS. III" long afterwards. Consequently, the dedication may also be read as "built by M. Agrippa son of Lucius, consul three times." See David L. Vagi, *Coinage and History of the Roman Empire*, vol. 2, Chicago 1999, pp. 233–234; Ilaria Romeo, *Ingenuus Leo: L'immagine di Agrippa*, Rome 1998, pp. 19–45.

4 Dio Cassius, 53.27.1–2 (cf. trans. as *Dio Cassius: Roman History*, by Earnest Cary and Herbert Foster, Cambridge 1917).

5 Dio Cassius, 66.24.

6 One source records that "Many public buildings were erected in Domitian's reign: ... and the Pantheon" (*Chronograph of* 354, for which see http://www.tertullian.org/fathers/chronography_of_354_00_eintro.htm; and Jerome's *Chronicles* in Rudolf Helm, ed., *Eusebius Werke. Siebenter Band, Die Chronik des Hieronymus*, Leipzig 1956; Abr. 2105, for which see also Malcolm Drew Donalson, *A Translation of Jerome's Chronicon with Historical Commentary*, Lewiston 1996).

7 Paulus Orosius, "Pantheum Romae fulmine concrematum," in *Historiae adversum paganos*, ed. C. Zangemeister, Leipzig 1889, 7.12.5; cf. Jerome in Helm 1956, p. 195; Eusebius of Caesarea, *Chronicon,* ed. Alfred Schoene, Berlin 1866, p. 219; Herbert Bloch, "I bolli laterizi e la storia edilizia romana," *Bullettino della Commissione Archeologica Comunale di Roma* 64, 1937–1938, pp. 1–353; p. 116.

8 Dio Cassius, 69.7.

9 Dio Cassius may have used sources such as an autobiography by Hadrian and a work by Marius Maximus, also long since lost, but the Roman consul was no eyewitness (Ronald Syme, *Emperors and Biography*, Oxford 1971, pp. 113–117, 128 ff.; Ronald Syme, ed., *Historia Augusta Papers*, Oxford 1983, pp. 16, 30 ff; Barry Baldwin, "Dio Cassius on the Period AD 96–180: Some Problematic Passages," *Athenaeum* 63, 1985, pp. 195–197. Book 69 of Dio Cassius's *Roman History* on the life of Hadrian is known to us only in an epitomized version; it was written in the eleventh century by the Byzantine jurist, later monk, eventually the patriarch of ancient Trapezus, Ioannes Xiphilinos, for emperor Michael VII Dukas (1071–1078). We do not know how much is really Dio's own work, and how much is that of Xiphilinos. Cf. Fergus Millar, *A Study of Dio Cassius*, Oxford 1966; P. A. Brunt, "On Historical Fragments and Epitomes," *Classical Quarterly* 30, 1980, pp. 488–492.

10 Scriptores Historiae Augustae, *Hadrian,* 19.9–10: Cum opera ubique infinita fecisset, numquam ipse nisi in Traiani patris templo nomen suum scripsit. Romae instauravit Pantheum, Saepta, Basilicam Neptuni, sacras aedes plurimas, Forum Augusti, Lavacrum Agrippa; eaque omnia propriis auctorum nominibus consecravit.

11 Scriptores Historiae Augustae, *Antoninus Pius*, 8.2. On the interpretation of terms such as *instaurare* as used on inscriptions, see E. Thomas and E. Witschel, "Claim and Reality of Roman Rebuilding Inscriptions from the Latin West," *Papers of the British School at Rome* 60, 1992, pp. 135–177; cf. G. Fagan, "Reliability of Roman Rebuilding Inscriptions," *Papers of the British School at Rome* 64, 1996, pp. 81–93. Dio's belief that the Pantheon was built by Agrippa could explain why he refers to the interventions by Hadrian and Antoninus Pius as restorations.

12 The brickstamps were incorporated in the *Corpus Inscriptionum Latinarum* (CIL), volume XV. Brickstamps CIL XV 424 a 1 (one example not in situ) and CIL XV 617.1 (one example not in situ have been dated to the Antonine period by Steinby (E. M. Steinby, "La cronologia delle figliane doliare urbane dalla fine dell'età repubblicana fino all'inizio del III sec.," *Bullettino di archeologia cristiana* 84, 1977, pp. 60 and 78).

13 The inscription reads: IMP CAES L SEPTIMIVS SEVERVS PIVS PERTINAX A ARABICVS ADIABENICVS PARTHICVS MAXIMVS PONTIF MAX TRIB POTEST X IM COS III P P PROCOS ET IMP CAES M AVRELIVS ANTONINVS PIVS AVG TRIB POTEST. COS PROCOS PANTHEVM VETVSTATE CORRVPTVM CVM OMNI CVLTV RESTITVER The brickstamps nos. CIL XV 155 and 157 found in the intermediate block have been dated to the Severan period (193–211), and CIL XV no. 602, found in the dome, is similarly assigned to 198–211, see Steinby 1977, CIL XV 155–157, pp. 37–38; CIL XV 602, p. 92.

14 The sizes of Roman bricks were different from bricks most commonly used today, being larger, square shaped and only some 2.5 cm to 4.5 cm thick (see Chapter Four).

15 Only the last brick of each batch, or one in so many, was stamped to ease the counting process, according to J. W. P. Campbell, *Brick in World History*, Cambridge 2003, p. 48.

16 It is important to acknowledge that there are different and even opposite approaches to dating Roman buildings by means of brickstamps. Their very usefulness has also been questioned; see Esther Boise Van Deman, *The Atrium Vestae*, Washington 1909, and "Methods of Determining the Date of Roman Concrete Monuments," *American Journal of Archaeology* 16, 1912, pp. 417–421. (For responses, see Bloch 1937–1938, p. 12; Steinby 1977, esp. p. 17).

17 D. Manacorda, "I diversi significati dei bolli laterizi – appunti e riflessioni," in *La brique antique et medieval: production et commercialisation d'un material*, ed. Patrick Boucheron, Henri Broise, and Yvon Thébert (Collection de l'Ecole Française de Rome 272), Rome 2000, pp. 127–159.

18 Manacorda 2000. The latest nonurban dated brickstamps were made in Todi in AD 93.

19 The first known dated brickstamp from Rome, CIL XV 18, was made in AD 110.

20 Heinrich Dressel and Herbert Bloch list some 289 variants of brickstamps mentioning Apronianus and Paetinus, the consuls in AD 123 (Heinrich Dressel, *Inscriptiones urbis Romae latinae*, Berlin 1891; Herbert Bloch, *I bolli laterizi e la storia edilizia romana. Contributi all'archeologia e alla storia romana (1937–1938)*, Rome 1947–1948 [supplement to Vol. XV, 1 of the Corpus Inscriptionum Latinarum; reprinted by Harvard Studies of Classical Philology LVI–LVI

(1947), LVIII–LIX (1948)]). The issue of the brickstamps from the year 123 is very intricate, and existing explanations may not have grasped its entire complexity.

21 The principle of consular dates was understood by Marini and earlier scholars. He argued, for example, that a brickstamp with the name of one of the consuls for the year 142, found in situ in the Baths of Diocletian, represented material reused from an older building, instead of evidence for a hitherto unknown consul from the time of Diocletian (Bloch 1937–1938, p. 4). Although compiled between 1789 and 1799, Marini's manuscript was kept in the Vatican Library until it was published by Gian Battista de Rossi in 1884 (in Rome) with the title *Iscrizioni antiche doliari*, and with the inclusion of important notes by Dressel.

22 Rodolfo Lanciani, *Pagan and Christian Rome*, Boston 1892, p. 158 (information on Falconieri); Francesco Piranesi, *Seconda parte de'templij antichi che contiene il celebre Pantheon*, Rome 1790, Tav. 28 and 29.

23 Carlo Fea, *L'integrità del Pantheon rivendicata a Marco Agrippa*, Rome 1807, p. 26. Fea highlighted one brickstamp he believed to be Trajanic (CIL XV 315), found during his investigations of the building in 1804. Being convinced that the core of the building was Agrippan/Augustan, he discharged the problem without any discussion; Fea 1807, pp. 27–28.

24 R. Phené Spiers, "Monsieur Chedanne's Drawings of the Pantheon," *Journal of the Royal Institute of British Architects* 2, 1895, pp. 175–182; cf. William C. Loerke, "Georges Chedanne and the Pantheon: A Beaux Arts Contribution to the History of Roman Architecture," *Modulus*, 1982, pp. 40–55.

25 Lanciani 1892, p. 151, writes "... this is not a real discovery, but confirmation of facts already known" (from Fea's investigation in 1804).

26 Luca Beltrami, *Il Pantheon: La struttura organica della cupola e del sottostante tamburo, le fondazioni della rotonda, dell' avancorpo, e del portico, avanzi degli edifici anteriori alle costruzioni adrianee. Relazione delle indagini eseguite dal R. Ministero della Pubblica Istruzione negli anni 1892–93, coi rilievi e disegni dell' architetto Pier Olinto Armanini*, Milan 1898.

27 Bloch (1937–1938, p. 7) acknowledges his great debt to Dressel's work (1891), but points out that his treatment of undated brickstamps is erratic. Having identified brickstamps with the consular date 123, Dressel assumed that all of the bricks made by the same brickmakers should be ca. 123, ignoring the possibility that their activities could have extended over several years.

28 Bloch dated many important public buildings from the reigns of Domitian, Trajan, Hadrian, and

Antoninus Pius, along with two buildings from the third and fourth centuries.

29 Dressel 1891; Bloch 1937–1938.

30 Steinby 1977, pp. 7–113; Janet DeLaine, "Building Activity in Ostia in the second century AD," *Acta Instituti Romani Finlandiae* 26, 2002, pp. 41–102.

31 Bloch 1937–1938, p. 117.

32 Apart from Dressel's publication of 1891, Bloch's work was also based on the study by Guey, which was published the year before, 1936; J. Guey, "Devrai-on dire: Le Panthéon de Septime Sévère? A propos des estampilles sur briques recueillies dans ce monument, notamment en 1930 ou en 1931 et depuis," *Mélanges d'Archéologie et d'Histoire* (Ecole Française de Rome) 53, 1936, pp. 198–249.

33 Bloch 1937–1938; Bloch 1947–1948; Bloch, "The Serapeum of Ostia and the Brick Stamps of 123 AD," *American Journal of Archaeology* 63, 1959, pp. 225–240; Steinby 1977; DeLaine 2002. All of these authors concord on this dating.

34 For a complete list of brickstamps found in situ in the Pantheon, divided into categories, see Hetland 2007.

35 Apart from the 4 dated brickstamps, the following are assigned to the Trajanic period: CIL XV 314–315 (8); CIL XV 377 (1); CIL XV 693 (3); CIL XV 811 d–f (3); CIL XV 1008 (1); CIL XV 110 (3). The combined total amounts to 19 brickstamps.

36 Bloch 1937–1938, pp. 112–117.

37 Bloch 1937–1938, pp. 14–19; pp. 316–320.

38 Bloch 1937–1938, pp. 87–102.

39 *Inscriptiones Latinae selectae*, ed. Hermann Dessau, Berlin 1906, 8658, 3, as reported by Bloch 1937–1938, p. 317.

40 Bloch 1937–1938, pp. 317–318.

41 Bloch 1937–1938, pp. 316–320; Bloch 1959.

42 Bloch 1959.

43 Vitruvius 2.3.1–4. Ever since Boëthius's mention, Vitruvius's recommendation has been used to support Bloch's hypothesis; see Axel Böethius, "La datazione dei mattoni," *Eranos* 39, 1941, pp. 152–156; Bloch 1959, pp. 225–240; A. C. G Smith, "The Date of the Grandi Terme of Hadrian's Villa at Tivoli," *Papers of the British School at Rome* 46, 1978, pp. 73–93.

44 Vitruvius 2.3.2.

45 T. Helen, *Organisation of Roman Brick Production in the First and Second Century AD*, Helsinki 1975, pp. 16–18.

46 See Hetland 2007 for details on the manual production of bricks made of clay from the Tiber valley.

47 Bloch 1959, pp. 225–240. In fact, 15 (or 41%) of the total of 36 brickstamps found in situ in the Serapeum were made in the years 125 and 126.

48 Bloch 1959, pp. 225–240, esp. p. 234: "It seems most remarkable, that in 125, and assuredly in 126, the supply of bricks manufactured before 123 to be used in the walls were virtually exhausted."

49 Bloch 1937–1938, p. 113: "Come per tutti gli edifici del gruppo, M. Rutilio Lupo ha fornito mattoni anche per la costruzione del Pantheon: essi sono tutti datati. ... In altri termine: è rappresentato ogni anno della serie datata, ciò è identico a quanto abbiamo osservato nel 'quartier des docks' in Ostia (cfr. anche il Palazzo Imperiale in Porto), senza che si possa in nessuno dei casi desumere qualche cosa sull'andamento dei lavori, anzi non abbiamo nè per il Pantheon nè per gli *horrea* in Ostia il minimo indizio che la costruzione sia stata iniziata prima dell'avvento al trono di Adriano."

50 DeLaine suggests that Bloch was aware of this fact, despite his contrary arguments. (DeLaine 2002, esp. pp. 42–43; see also p. 78). The brickstamps found in and around the building are from the years 114–117, which also may be an indication that the works were finished by 118.

51 Bloch 1937–1938, pp. 100–102.

52 Bloch 1937–1938, p. 114: "Con ciò è accertata la contemporaneità del Pantheon e delle costruzioni trattate sopra [i.e.. Il 'Quartier des Docks' (Ostia), La Casa dei Triclinii (Ostia), Il Portico di Claudio (Portus), Il Palazzo Imperiale (Portus)]."

53 Bloch 1937–1938, pp. 14–19; pp. 112–117.

54 In the last years of the reign of Trajan, Anteros Severianus apparently started using a new matrix, CIL XV 811 a–c. Bloch (1937–1938, pp. 112–113) emphasizes that it is not possible to see an immediate and absolute change; he does suggest, though, that by Hadrian's reign, all of Anteros Severianus's workers were using only this matrix. However, it is impossible to exclude the possibility that some of these types were produced contemporaneously, and so it is best to assign them a broad date range, late Trajanic/early Hadrianic.

55 Bloch 1937–1938, p. 112: "... tuttavia egli disponeva ancora, quando il Pantheon fu costruito, di vecchie rimanenze munite dei timbri 811 d e f : 4 es. (3 in situ + 1). 811 d, f appartengono, come abbiamo dimostrato, al primo e al principio del secondo decennio del secondo secolo d. Cr." English translation: "... after all he [Anteros Severianus] still disposed, when the Pantheon was constructed, of old remains with stamp types 811 d e f : 4 (3 in situ + 1). 811 d, f belong, as we have demonstrated, to the first and the beginning of the second decade of the second century."

56 Bloch 1937–1938, pp. 112–117.

57 Often it seems that it is Bloch's and Steinby's *assumption* of a Hadrianic date for the Pantheon that guides the date assigned for undated brickstamps; for more details, see Hetland 2007.

58 Bloch 1937–1938, p. 116: "È strano che dopo la catastrofe nel 110 il monumento restò come era, salvo forse insignificanti riparazioni."

59 This was brilliantly pinpointed by Wolf-Dieter Heilmeyer, "Apollodorus von Damaskus – der Architekt des Pantheon," *Jahrbuch des Deutschen Archäologischen Instituts* 90, 1975, pp. 316–347, esp. p. 328.

60 Bloch 1937–1938, p. 116. "L'attuale costruzione non può essere anteriore al 117, e se si considera che si tratta di un monumento imperiale ... non può essere dubbia la conclusione che il totale rifacimento si iniziò solo dopo che l'imperatore era venuto a Roma, cioè dopo il principio del luglio 118, nella seconda metà del 118 o nel 119, ossia il principio della costruzione cade ancora nell epoca di Apollodoro di Damasco, che forse non fu estraneo al grandioso progetto."

61 For the date of Trajan's Baths, see J. C. Anderson, Jr., "The Date of the Thermae Traiani and the Topography of the Oppius Mons," *American Journal of Archaeology* 89, 1985, pp. 499–509 (who argues for an earlier, Domitianic, initiation of the works); G. Caruso and R. Volpe, s.v. "Thermae Traiani," in Steinby 1995–1999, vol. 5 1999, pp. 67–69. For Trajan's Markets, see Lynne Lancaster, "The Date of Trajan's Markets: An Assessment in Light of Some Unpublished Brick Stamps," *Papers of the British School at Rome* 63, 1995, pp. 25–44; E. Bianchi, "I bolli laterizi dei Mercati Traiani," *Bullettino di archeologia cristiana* 104, 2003, pp. 329–352; L. Ungaro, s.v. "Mercati di Traiano," in Steinby 1995–1999, vol. 3, Rome 1997, pp. 241–245. For Trajan's Forum, see James Packer, s.v. "Trajan's Forum," in Steinby 1995–1999, vol. 5, Rome 1999, pp. 348–356; E. Bianchi, "I bolli laterizi del Foro di Traiano: il catalogo del Bloch e i rinvenimenti delle campagne di scavo 1991–1997 e 1998–2000," *Bullettino della Commissione Archeologica Comunale di Roma* 102, 2001, pp. 82–120. For Atrium Vestae, see R. P. Scott, s.v. "Atrium Vestae," in Steinby 1995–1999, vol. 1, Rome 1995, pp. 138–142.

62 Anthony R. Birley, *Hadrian: The Restless Emperor*, London 1997, p. 191.

63 Dio Cassius (69.4.1) states that Apollodorus built the forum, the odium, and the gymnasium for Trajan in Rome. The bridge over the Danube (the ancient Ister) was described by Procopius as being built by Apollodorus (Procopius, *Buildings*, IV.6.12–13). Dio Cassius (68.13) also describes the building of the bridge, but he does not attribute it to Apollodorus. The *Historia Augusta* (XIX.13) states that Apollodorus assisted the emperor Hadrian with the constructing and the moving of the colossal statute of the Moon (situated on the western side of the Flavian Amphitheatre, the Colosseum).

64 Several scholars credit Apollodorus with Trajan's Forum (including Trajan's Column), Trajan's Markets, Trajan's Baths, and the bridge over the Danube; see inter alia William L. MacDonald, *The Architecture of the Roman Empire*, vol. 1, *An Introductory Study*, London 1965, pp. 133–134; John Ward-Perkins, *Roman Imperial Architecture 2*, London 1981, p. 9; Mark Wilson Jones, *Principles of Roman Architecture*, New Haven 2000, pp. 21–24 (who, however, leaves the Markets as an unresolved attribution and gives further references to others who have given Apollodorus a more extensive portfolio).

65 Bloch 1937–1938, p. 116; Heilmeyer 1975, pp. 316–347; Alessandro Viscogliosi, " Il Pantheon e Apollodorus di Damasco," in *Tra Damasco e Roma: L'architettura di Apollodoro nella cultura classica*, ed. Festa Farina et al., Rome 2001, pp. 156–183; Wilson Jones 2000, pp. 192–193, 212; Gerd Heene, *Baustelle Pantheon: Planung, Konstruction, Logistik*, Düsseldorf 2004.

66 Heilmeyer 1975, esp. p. 328. In a 1994 article, Lothar Haselberger endorses Heilmeyer's suggestion and argues for a Trajanic dating; L. Haselberger, "Ein Giebelriss der Vorhalle des Pantheon. Die Werkrisse vor dem Augustusmausoleum," *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung* 101, 1994, pp. 279–309, esp. pp. 296–298.

67 Heilmeyer 1975. Stylistic similarities between the architectural decoration of the late Trajanic and early Hadrianic periods have also been linked to Apollodorus by Strong (D. E. Strong, "Late Hadrianic Architecture Ornament in Rome," *Papers of the British School at Rome* 21, 1953, pp. 118–151).

68 Smith 1978, pp. 75–93. Smith accepted Bloch's theory that bricks were cured for a period of years before they were used (Bloch 1937–1938 and 1959, pp. 225–240; Smith 1978, pp. 75–93). He also believed that the Pantheon was built contemporaneously with the earliest parts of Hadrian's Villa (Smith 1978, p. 77), which he dates to sometime after 117. Smith's hypothesis found support from Mary T. Boatwright in her work on buildings in Rome connected with Hadrian, who called Heilmeyer's Trajanic dating of the Pantheon "quite implausible" (Mary T. Boatwright, *Hadrian and the City of Rome*, Princeton 1987, p. 13).

69 It is listed under the first year of Hadrian's reign, in 117 (Dio Cassius, 69.4).

70 Heene (2004) also follows Heilmeyer's late Trajanic time scheme for the Pantheon, though without any explanation. Heene offers new thoughts as to how the construction of the Pantheon proceeded that contrast with the intriguing (if not very feasible) rope-technique solution put forward by Taylor (Rabun Taylor, *Roman Builders*, Cambridge 2003); cf. Mark Wilson Jones, "Review of R. Taylor's Book: *Roman Builders*," *Journal of Roman Archaeology* 16, 2003, pp. 557–560.

71 The idea that the emperor Hadrian was involved in, perhaps even responsible for the design of, the Pantheon is often mentioned in the scholarly literature: F. E. Brown, "Hadrianic Architecture," *Essays in Memory of Karl Lehmann*, ed. L. F. Sandler, New York 1964, pp. 55–58; Kjeld de Fine Licht, *The Rotunda in Rome. A Study of Hadrian's Pantheon*, Copenhagen 1968; MacDonald 1976, pp. 11–12; H. Stierlin, *Hadrien et l'architecture romaine*, Fribourg 1984; Boatwright 1987, pp. 30–31; P. Gros, "Hadrien architecte. Bilan des recherches récentes," *Hadrien empereur et architecte*, ed. M. Mosser and H. Lavagne, Paris 1999, pp. 33–53, esp. pp. 48–57; E. Salza Prina Ricotti, "Adriano – architetto, ingegnere e urbanista," *Adriano architettura e progetto*, Milan 2000, pp. 41–44; Ricotti, *Villa Adriano: il sogno di un imperatore,* Rome 2001; D. Danziger and N. Purcell, *Hadrian's Empire: When Rome Ruled the World*, London 2005, pp. 17–18.

72 The term "the Roman Architectural Revolution" was first coined by MacDonald (1965, pp. 41–46), and later adapted by another influential scholar, Ward-Perkins (1981, pp. 97–120).

73 The expression "Hadrianic architecture" was first used by Italian scholars such as Promis and Rivoira, see C. Promis, "Gli architetti e l'architettura presso i Romani," *Reale academia delle scienze di Torino: Memorie* 28, 1873, pp. 177–180; Giovanni T. Rivoira, "Di Adriano architetto e dei monumenti Adreanei," *Rendiconti della Accademia dei Lincei* 18, fasc. 3, 1909; Rivoira, *Roman Architecture and Its Principles of Construction Under the Empire, with an Appendix on the*

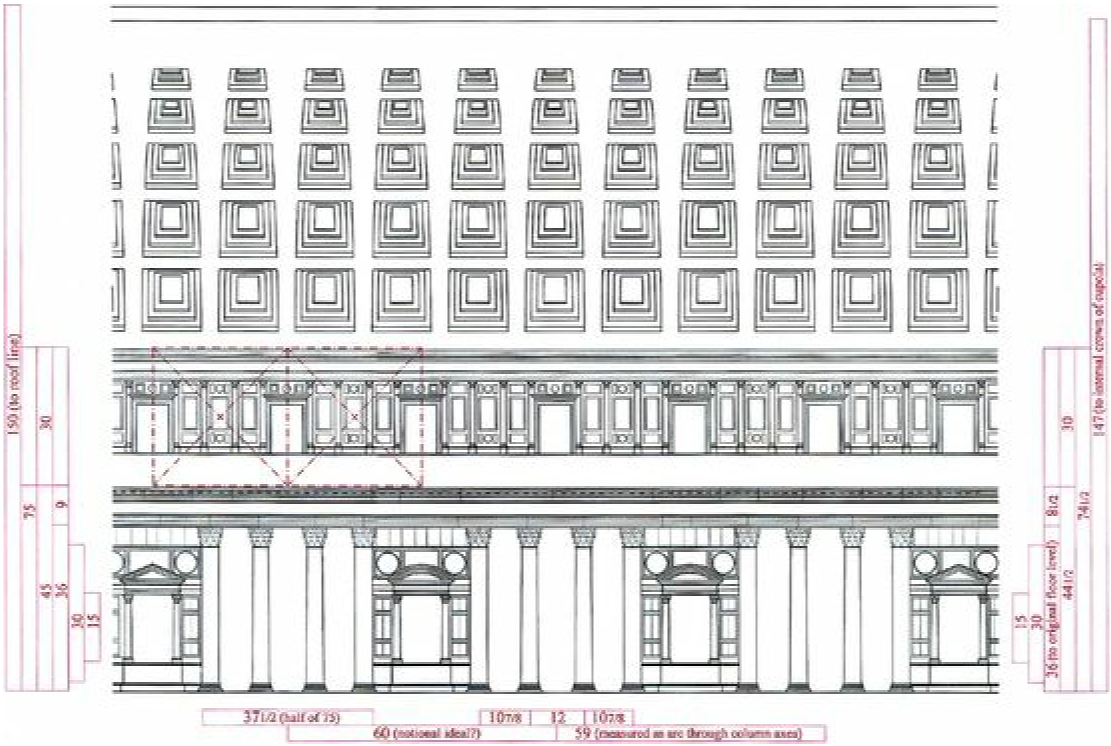
Evolution of the Dome Up to the 17th Century, New York 1972, p. 118. It was taken up by Toynbee, Snijder, and Strong; see J. M. C. Toynbee, *The Hadrianic School, a Chapter in the History of Greek Art*, London 1934, esp. p. iii; Geerto A. S. Snijder, "Kaiser Hadrian und der Tempel der Venus und Roma," *Jahrbuch des Deutschen Archäologischen Instituts* 55, 1940, pp. 1–11; D. E. Strong, "Late Hadrianic Architecture Ornament in Rome," *Papers of the British School at Rome* 21, 1953, pp. 118–151, and later amplified by Brown (1964). Since then, the idea of "Hadrianic" architecture has received numerous endorsements, of which the following is a selection: MacDonald 1965, pp. 94–121, pp. 129–137; MacDonald 1976; William L. MacDonald, "Hadrianic Circles," *Journal of the Society of Architectural Historians* 43, 1993, pp. 394–408; C. F. Giuliani, "Volte e cupole a doppia calotta," *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung* 82, 1975, pp. 329–342; Boatwright 1987, p. 8; D. M. Jacobson, "Hadrianic Architecture and Geometry," *American Journal of Archaeology* 90, no. 1, 1986, pp. 69–89, esp. pp. 57–71; Wilson Jones 2000, esp. pp. 93–100; Anna Maria Reggiani, "Villa Adriana. Riflessioni per la conoscenza di un unicum," *Adriano: architettura e progetto*, Rome 2000, pp. 3–8, esp. p. 7; E. Salza Prina Ricotti, *Villa Adriano: il sogno di un imperatore*, Rome 2001, esp. pp. 21–22.

Four The Conception and Construction of Drum and Dome

Giangiacomo Martines

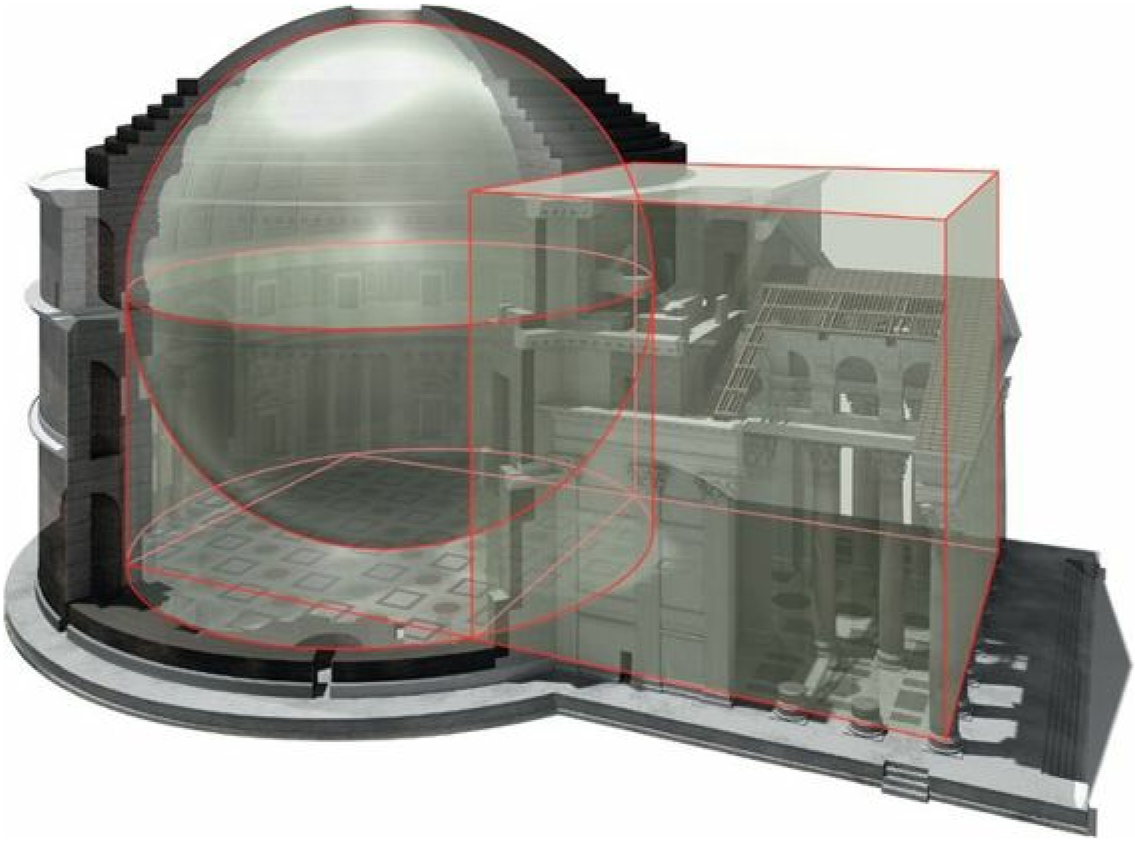
Sphere and Cylinder: Models of Mathematical Harmony and Perfection

Roman architecture can exhibit considerable complexity and sophistication, yet it typically does so by means of elaborating on an elemental geometrical conception.[1] The Pantheon exemplifies this principle. Despite the intricacy of its constructive system, the unity of the composition is easy to grasp, as Georges Chedanne's wonderful cutaway conveys (see Plate XI). In his introduction to the building in his famous treatise on architecture, Andrea Palladio highlights the main geometrical intention behind the design of the interior: "Some maintain it is the same round shape as the world: the height from the floor to the opening in the ceiling, from whence light enters, is the same as its width, that is, the diameter from one wall to the other."[2] The Rotunda is as impressive today as it was for Palladio, and it does indeed circumscribe a sphere. The only source of light, the oculus, draws the visitor to the center of the space, where we can wonder at the monumental interplay of a hemispherical dome resting on a cylinder of the same height, a geometry confirmed by modern precision surveys (see Plate XII and Fig. 6.6).[3] This sort of geometry was characteristic of Roman architecture. In his chapter on baths, Vitruvius describes a circular room with a dome in the following terms: "The Spartan sauna and sweating chambers should be joined onto the *tepidarium*, and however broad these are, they should have the same height up to the springing of the dome."[4] The rapport between cylinder and hemisphere is, however, different from that found in the Pantheon. The equality of width to height includes the dome in the Pantheon, but excludes it in Vitruvius's *laconicum*, the total height of which was thus one and a half times its width.[5] Numerous buildings from the Roman period present variations on the theme of a hemispherical dome resting on a cylinder, including nymphaeums, tombs, and bathing rooms.[6] None, though, were as large as the Pantheon.



X. Pantheon interior elevation laid flat with proportions overlaid. (Wilson Jones 2000, Fig. 9.13)

XI. Cutaway axonometric projection of the Pantheon by George Chédanne, 1891. (Paris, École Nationale Supérieure des Beaux-Arts, *Envoi*, inv. 24804)



XII. Virtual visualization of the Pantheon's geometry. (Conception Mark Wilson Jones, realization Robert Grover)

The geometry of the Pantheon calls to mind the title of an important work of ancient science, as would have been evident to any ancient mathematician standing in the center of the Rotunda. *On the Sphere and Cylinder* is a fundamental work of Archimedes. In this his longest treatise, he established the formula we learn at school for calculating the volume of a sphere, $V = 4/3 \pi r^3$.[7] The subject is the same as Book XII of Euclid's *Elements*, written over half a century earlier, but which gave no rules for calculations.[8] Archimedes' findings on the sphere were totally new for the third century BC and are still definitive today. His procedures came from examining a sphere and a cylinder of equal diameter, just as in the Pantheon.[9] His breakthrough was linked to the concept of *symmetria*, or mathematical harmony (literally the coming together of measures), an ideal that was intrinsic to ancient architectural design.[10] In the introductory letter, after stating the main relationships between a cylinder and sphere of the same width and height – that the volume and the area of surface of the former are both 3/2 as great as those of the latter – he went on to observe: "Now these properties were all along naturally inherent in the figures referred to, but remained unknown to those who were before my time engaged in the study of geometry, because none of them realized that there exists *symmetria* between these figures."[11] Here, "*symmetria* between these figures" means that they are commensurable and expressible through the relationship of small whole numbers. Attilio Frajese, who published the first complete Italian edition of the work, says, "Archimedes senses that lying beneath complex geometrical facts there must be corresponding simple arithmetical facts."[12] Indeed, apart from the relationships already mentioned, Archimedes proved that the surface of the sphere and the curving surface of a circumscribed cylinder must be equal. Thus in the Pantheon interior, the surface area of the drum is equal to that of the dome it carries. The harmony between these two figures is expressed by the simplest possible ratio of 1:1, both for the radii and the surfaces.

Archimedes also wrote of conoids (i.e., paraboloids and hyperboloids) and spheroids (i.e., ellipsoids), but it was the sphere and the cylinder that he loved best, perhaps because of this elemental symmetria. Cicero found proof of this, it seems, when he was quaestor of Marsala, in Sicily. In 75 BC, he went to Syracuse to find Archimedes' tomb outside the walls: "I remembered certain doggerel lines inscribed, as I had heard, upon his tomb, which stated that a sphere along with a cylinder had been set up on the top of his grave."[13]

The connection between abstract mathematics and physical spatial forms was certainly perceived by Archimedes. His *Method of Mechanical Theorems* relates how he applied the notion of the center of gravity and the lever to the investigation of geometrical figures by dividing solids into straight strips and then "weighing" them on a notional balance, as in the science of mechanics. This approach was as innovative as it was typical of Archimedes. Areas acquire a virtual weight and are balanced against each other, by which means the relative surface areas could be gauged. As he noted in a letter to Eratosthenes, the mathematician and librarian at the Museum of Alexandria in Egypt: "[I]t is easier to supply the proof when we have previously acquired ... some knowledge of the questions than it is to find it without any previous knowledge."[14]

The theorems on the sphere and the cylinder, too, were conceived as problems of mechanics. Thus, the concepts of geometry, symmetria, and balance were related to one another. Until Archimedes' *Method of Mechanical Theorems* was rediscovered at the beginning of the twentieth century by Johan Ludwig Heiberg,[15] his reasoning was only known through the quotations of Hero of Alexandria.[16] Hero, a mathematician from the time of the emperor Nero, also wrote a treatise for architects on the lifting of weights.[17] The central importance of this way of thinking in the creation of the Pantheon seems to be confirmed by the simple dimension, 150 feet (or 100 cubits), that defines the diameter of the ring of its interior columns. What is more, a square inscribed in this circle can be "flipped" over to produce another square that locates the columns of the portico (see Fig. 1.5 and Plate XII).[18]

The coffers of the dome of the Pantheon are divided into five rows of 28, a number that expresses an idea of perfection.[19] The number 28 is in fact a "perfect number," one that is equal to the sum of its factors (28 equals 1 + 2 + 4 + 7 + 14, each of which divides into 28). Perfect numbers are rare; units, tens, hundreds and thousands have one each: 6, 28, 496, and 8128, respectively. Following a tradition going back to the Pythagoreans, it was in Hadrian's time that Nichomachus of Gerasa included in the first book of his influential *Introduction to Arithmetic* a discussion of perfect numbers.[20] For Nichomachus, such numbers are associated with virtue, moderation, and beauty; arithmetic, music, geometry, and astronomy are like "bridges" and "stairways" to knowledge.[21]

There are other interpretations of the intentions behind the choice of 28 for the numbers of lines of coffers. Mark Wilson Jones has explained that this is a key ingredient of the interplay of rhythms and alignments – and selective lack of alignment – orchestrated between the pattern of the floor, the articulation of the wall, and the coffering of the dome (see Plate X).[22] As in so many other Roman buildings, a series of subordinate proportions entered into the composition and deployment of smaller units, including the exedras, columns, aedicules and moldings (see Chapter Five).[23] There is complexity, but never does it banish the underlying geometrical simplicity; the two poles of design are kept in balance.

This concept of balance, neither too much nor too little, is central to the aesthetics of architecture. At the end of the classical era of great Western domes, around AD 560, Procopius of Caesarea described the dome of St. Sophia in Constantinople in these terms:[24] "[I]t proudly reveals its mass and the harmony of its proportions, having neither any excess nor deficiency."[25]

In classical architecture, geometry is like one of Nichomachus's stairways, leading to higher realms of both aesthetic achievement and knowledge. The interior of the Pantheon arouses sentiments on the part of many a visitor similar to those expressed by Procopius, without necessarily knowing the ideas of Archimedes or Nichomachus. Yet knowledge of them gives access to further intellectual pleasures.

Description of the Structure

How did the architect of the Pantheon turn the elemental concept of cylinder and hemisphere into reality on such a scale and build the largest dome that had ever been built? To understand this, we must first understand the structure of the cylinder-drum and the hemisphere-dome, both of which are neither immediately visible nor comprehensible in their three-dimensional entirety.

It would be vain to make this attempt except on the basis of a thorough account of the physical fabric. In Hadrian's time, Lucian of Samosata, a Syrian orator, marked the beginnings of art literature by popularizing the literary genre called *ekphrasis*, which means "description" in Greek. An ekphrasis recreates a work of art in words, stirring the imagination and arousing emotions in the reader; it communicates the idea and the effect of the work to someone far away. To help us understand the structure of the Pantheon, there follows a selection of some of the most concise modern *ekphraseis,* presented not in chronological order but, rather, moving upward from the bottom to the top. These passages, by Adam Ziolkowski, Luca Beltrami, and William MacDonald, respectively may be further appreciated by viewing the color drawings of the elite nineteenth-century French architects Achille Leclère and Chedanne (see Plate XI). Ziolkowski, author of the entry on the Pantheon in the authoritative *Lexicon Topographicum Urbis Romae*, describes the drum seen from the inside:

> The drum rests on a ring of concrete 7.3 m wide and 4.5 m deep. ... Its wall, notionally 6.2 m thick, made of concrete faced with brick, contains cavities arranged on three levels, marked by the three cornices on the outer face of the drum. On the lowest level there are eight large apertures, the entrance and seven exedrae opening to the inside on the rotunda's main and diagonal axes. The four diagonal exedrae are trapezoidal, the other three apsidal. In front of each side exedra there is a pair of columns set in line with the wall; the architraves superincumbent on these columns are continuations of a cornice running round the interior and marking the top of the lower zone. ... All these apertures are two storeys high, each of the six side exedrae being topped above the architrave by a sort of unfloored chamber.[26]

On the third story there is another set of large chambers (see Plate IV and Figs. 5.1b, 6.2), this time of uniform configuration, whether they align with the cross axes or the diagonal axes. Beltrami, who directed important investigative campaigns in 1892–1893, explains their geometrical division:

> The exedrae have chambers that are divided into three sections by two radial walls. Vertically these divisions fall over the axes of the Corinthian columns (of the lower level). ... These 1.2 metre thick walls act as buttresses and connect the masonry at the springing of the dome to that of the external drum. ... The 6-metre perimeter thickness [of the drum] is divided into three: a 1.9 metre thick inside wall, another 1.9 metre thick outside wall and 2.07 metre wide ring chambers.[27]

In alternation with this system of voids is another family of smaller semicircular chambers that occur on all three levels. On the ground floor and also on the top level, they are reached from the outside via small openings shaped like doorways. On account of the great number of all these different types of voids, MacDonald, author of an inspirational introduction to the Pantheon, likens the structure of the drum to a honeycomb and describes its external configuration:

> On the outside the rotunda reads as an almost solid cylindrical wall of brick. There are openings in it here and there, at various levels, that give on to some of the many different chambers that honeycomb the rotunda structure, a honeycombing that is an integral part of a sophisticated engineering solution to the problem of supporting the huge dome.[28]

The exterior of the Rotunda is subdivided by cornices into three parts, or stories. The first cornice lies at the height of the frieze over the Corinthian columns inside the building, the second lies at the springing of the dome, and the third registers the top of the drum (see Figs. 1.12, 1.13, 6.3). Moving on to the dome, MacDonald notes:

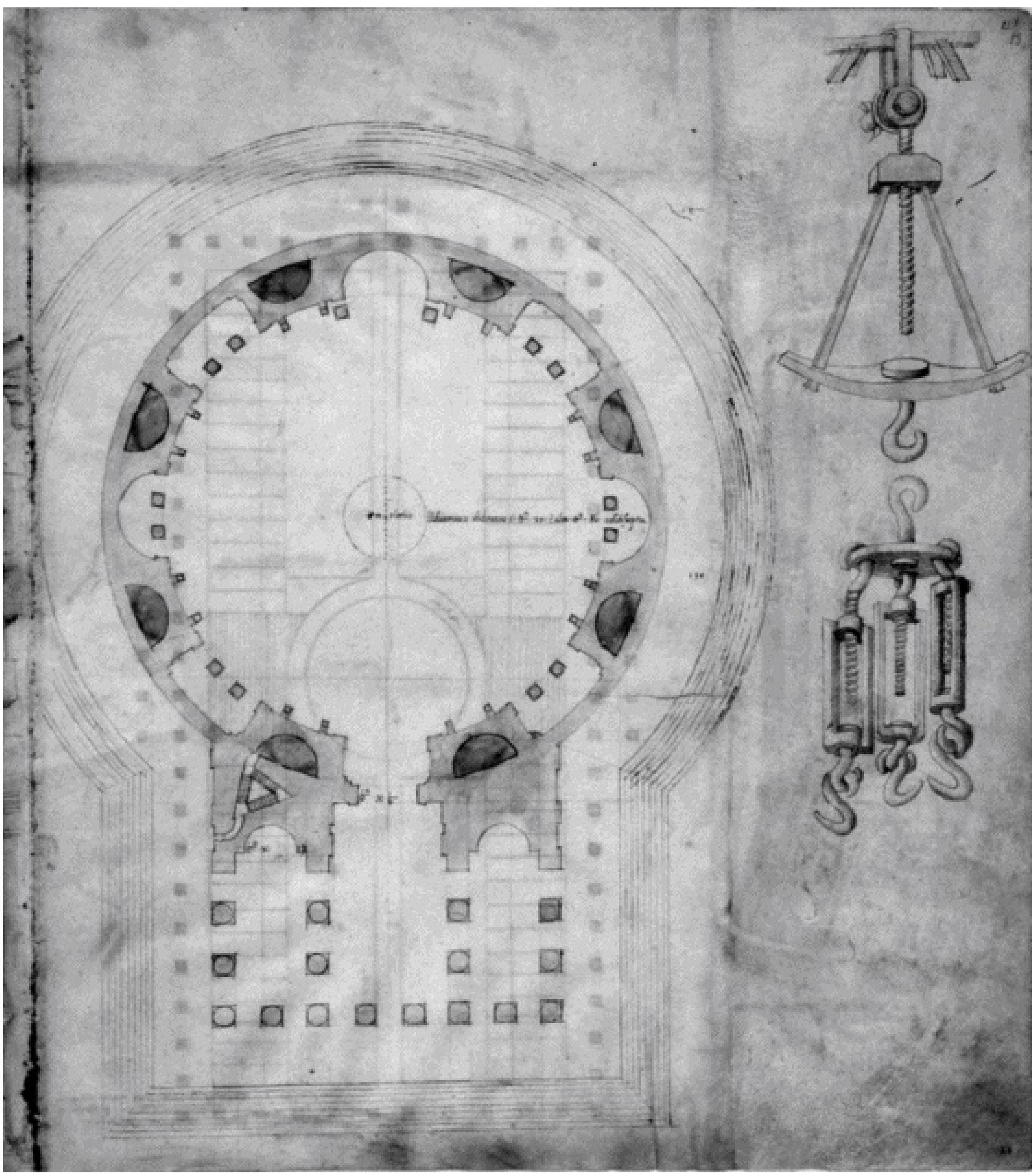
> Rather more than half of the exterior rise of the dome is defined by a series of concentric step-like rings that are actually buttresses, masses of masonry placed over the dome's lower part where they are most needed structurally. ... Partly because of these ring buttresses, the exterior silhouette of the dome is not hemispherical but bowl-shaped; inside, the hemispherical surface of the dome rises from a level well below that of the outer high terrace. The upper part of the cylindrical wall of the rotunda is built up high, also as a shoulder-like buttress, reducing the prominence of the exterior of the dome. The only exterior spherical portion rises above the highest of the step-ring buttresses, extending upward and inward to culminate in a horizontal circular opening, an oculus, more than thirty feet (9.45 m) in diameter, which is centered over the paving a hundred and fifty feet below.[29]

The above extracts give us a clear picture of the structure of the dome and the distribution of spaces within it. We have now inspected the structure of the cylinder like a bee in the honeycomb described by MacDonald. We have a clear picture of the structure of the building and the spaces within it. We can easily make out eight piers and exedrae in the plan of the building (see Plate IV and Fig. 5.1b). The spaces are made up of exedrae and chambers up to the third story, arranged along the eight axes of the circumference. The vaulted chambers are enclosed by the internal and external walls of the drum and by radial walls. The exedrae look onto the rotunda and reach up to the second story. The third-story chambers are floored at the springing of the dome and open out onto the outer face of the rotunda. The cupola in its hemispherical purity is visible only in the interior, while on the exterior it

is partly concealed by the step-rings.

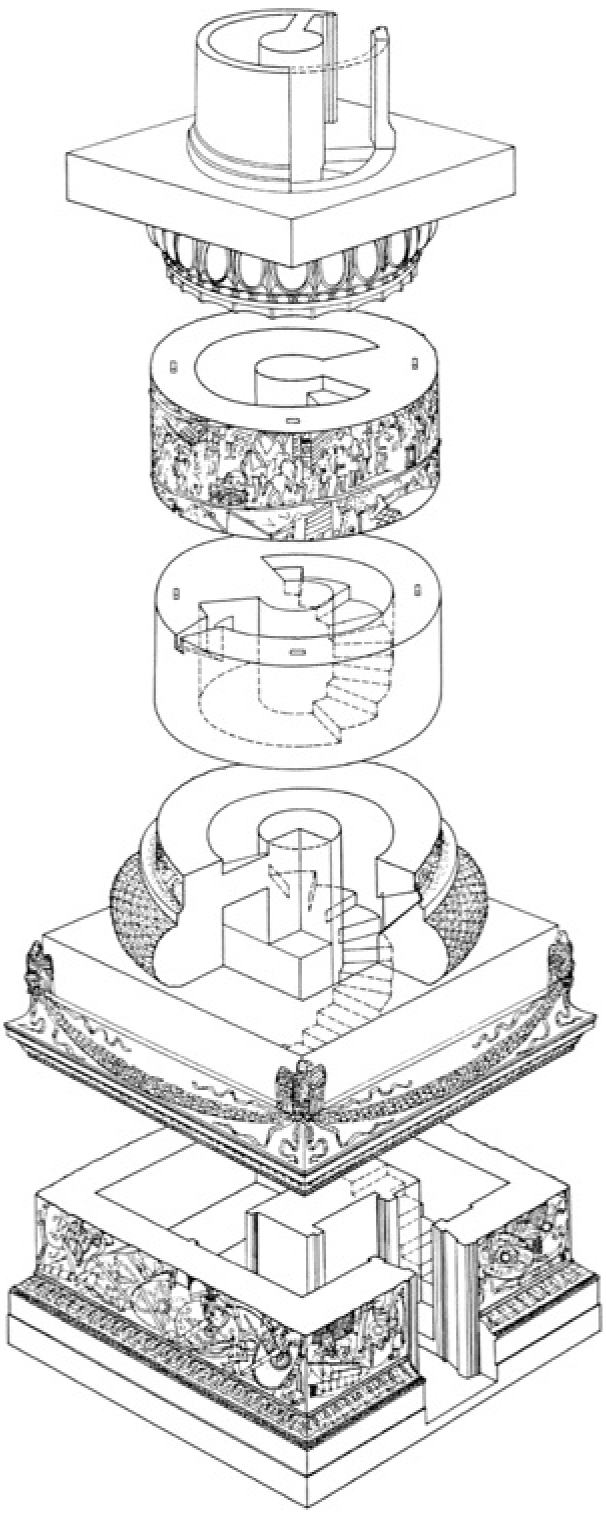
The Drum

The drum of the Pantheon is an immense structure, roughly 108 feet (32.2 m) tall and 21 feet (6.2 m) in thickness at the base, reducing to 20 feet (5.9 m) at the top. The ratio of the drum to the dome (44.08 m) is about 1 to 7.3.[30] Apart from its huge scale, what is most striking is the presence of the numerous voids that MacDonald likened to the cells of a honeycomb. Giuliano da Sangallo drew attention to them by using a dark tint on his plan in the *Codex Barberinianus* (Fig. 4.1),[31] perhaps to represent the darkness of the empty spaces. Some decades later, Sebastiano Serlio remarked that "I think the spaces are there to avoid using too much material. In any case, being circular they are very strong."[32] The sections of the wall between the apertures (i.e., the entrance and seven exedrae) act as eight huge piers onto which stress is directed by the vaulting over the apertures. The drum can thus be described both as a series of piers connected by walls or as two concentric walls connected by transverse walls.[33] The drum is what in modern terms we call a "diaphragm structure"; this structure is comparatively light and incredibly strong.



4.1. Plan of Pantheon by Giuliano da Sangallo, after 1465. (Biblioteca Apostolica Vaticana, *Vat. Barb. lat 4424*, f. 13 recto)

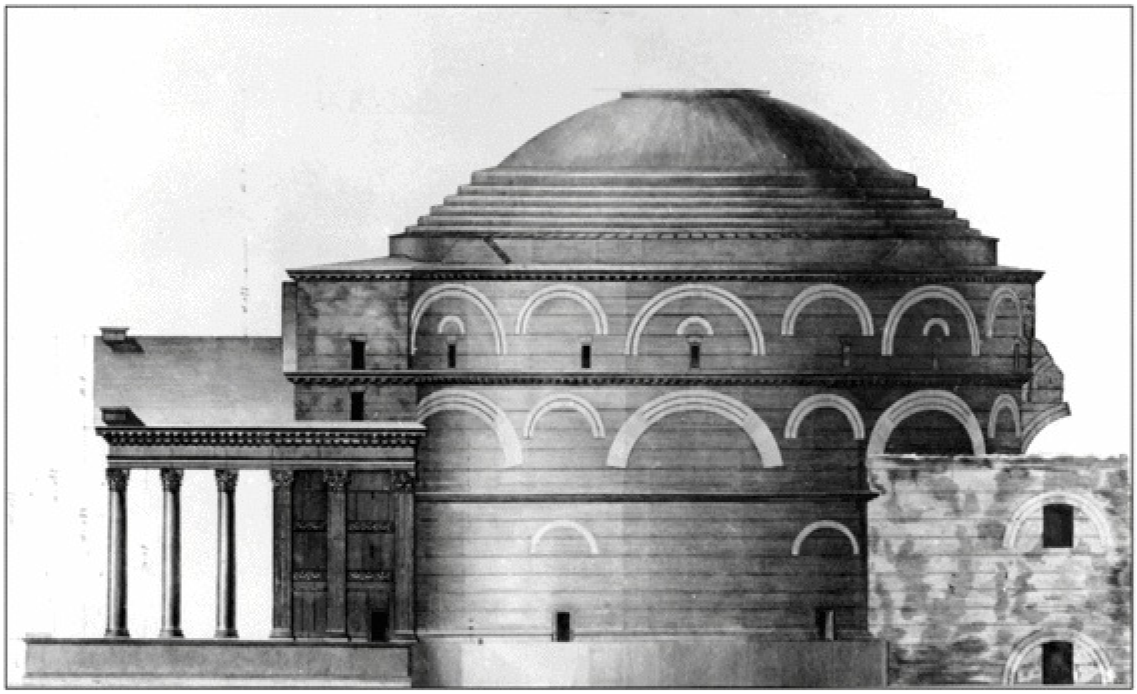
In Roman architecture, a beautiful example of a diaphragm structure in the form of a hollow pillar is Trajan's Column, inaugurated in AD 113 (Fig. 4.2). Its shaft comprises 19 hollowed-out monolithic marble drums, with a helical staircase running through them. This hollowing produces a structure that weighs a third less than a similar full column but has virtually the same stiffness.[34]



4.2. Exploded perspective of Trajan's Column. (Wilson Jones 2000, Fig. 8.8)

In the Pantheon the semicircular chambers inside the drum (24 in number, 8 for each tier) are

oriented so that they act like arches braced against the outward thrust of the rotunda. The Romans used this arrangement in retaining structures, as for example at the Mausoleum of Augustus (see Fig. 5.1a).[35] In the third story of the Pantheon (Fig. 4.3, and see Figs. 5.1b and 6.2), the niches are each divided by a radial wall, an arrangement that had also been adopted in the Mausoleum to counter the lateral pressure from the huge core. In Nero's Nymphaeum under the Temple of Divus Claudius, on the Celio in Rome, there are chambers with semidomes that lie on a structure consisting of two walls separated by a semicircular corridor.[36] In Hadrian's Villa, the pumpkinsemidome of the Serapeum has chambers at the springing, with a system of pillars and niches-openings-windows underneath (see Figs. 5.9 and 5.10).[37] This diaphragm strategy finds its most complete manifestation in the Pantheon.



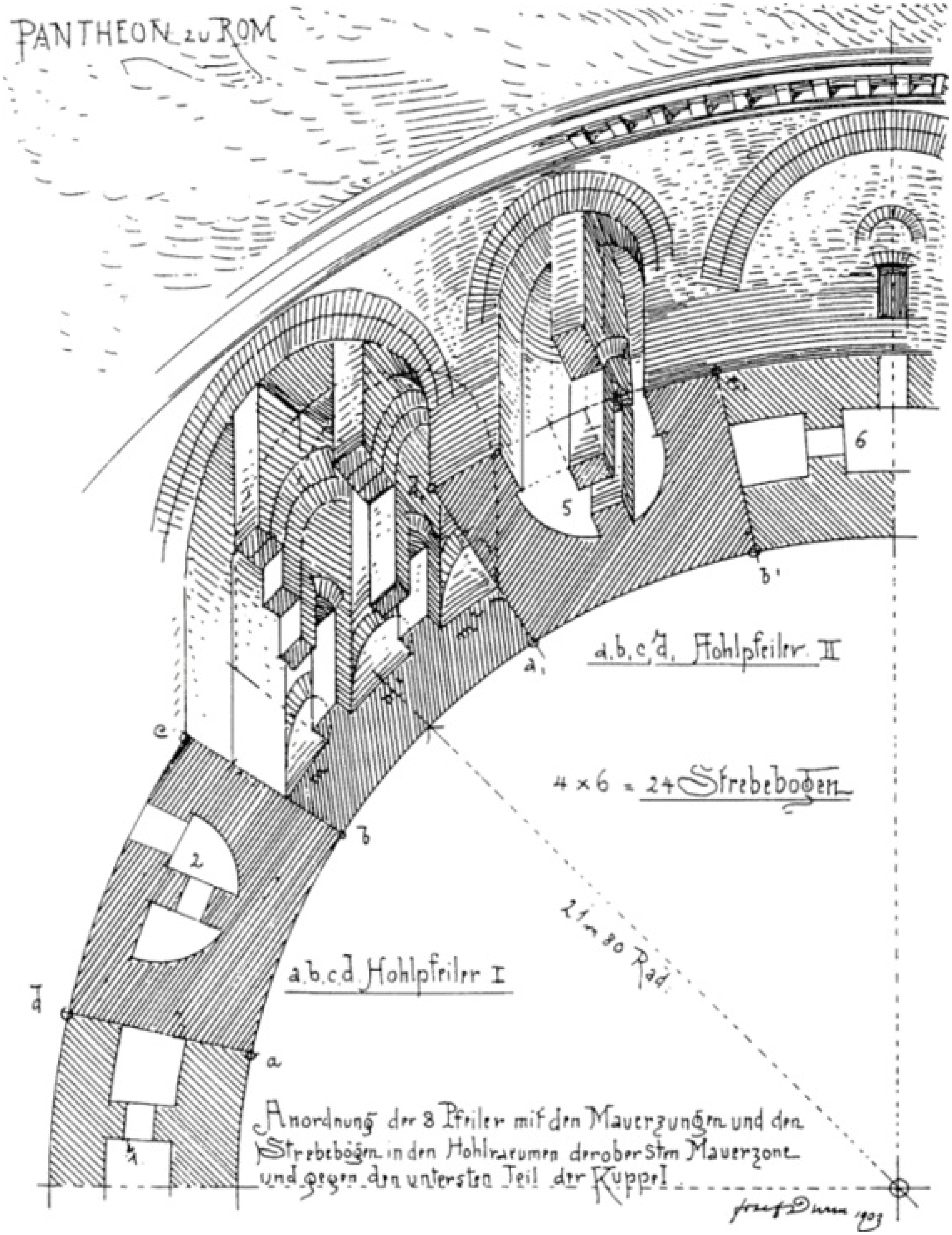
4.3. West elevation of Pantheon; engraving by Francesco Piranesi, Pantheon. (*Seconda parte de' tempij antichi che contiene il celebre Pantheon*, Rome 1790, Plate VII, Istituto Nazionale per la Grafica, Roma)

In the three storys of the Pantheon, the distribution of the masonry and its voids changes subtly. In the lower levels, semicircular voids alternate with the exedrae, while by the third story, above the springing of the dome, the voids are distributed more uniformly along the circumference. The dome therefore discharges its weight relatively evenly, while the drum then concentrates the load on the eight "piers." Piers and interlocking walls work together to support the dome.

The general idea behind this system for stiffening a structure while lightening it operates in Roman bridges, too. Piers are sometimes hollowed out by a smaller arch in order to prevent the pressure of a river in flood from bringing down the abutments. An example is the Pons Fabricius on the Tiber, built in 62 BC, which joins the Isola Tiberina to the Campus Martius. The two segmental arches have a span of 24.5 meters. The road on top is 5.5 meters wide, almost the same thickness as the Pantheon's drum. In the Pantheon, the system of piers and barrel vaults within the drum can be likened to a circular bridge, or rather, a circular aqueduct with three rows of arches, as in the Pont du Gard near Nîmes.

Let us now focus on the relationship between the spatial articulation of the rotunda and its fabric. The great mass of the drum is concrete encased in brickwork that acted both as formwork and facing

(Figs. 4.3 and 4.4, and see Fig. 3.4). The wall of the drum is built in *opus testaceum,*[38] involving *bessales* (bricks about 2/3 ft or 19.7 cm square), *sesquipedales* (bricks about 1 1/2 ft or 44.4 cm square), and *bipedales* (bricks or tiles 2 ft or 59.2 cm square). The latter have a thickness greater than the other two, typically in the range 4 to 4.5 centimeters (whereas bessales and sesquipedales range between 2.5 cm and 4 cm thick). After having been baked in these sizes, bricks were often cut into smaller units. The bessales and sesquipedales were generally cut in half on the diagonal to make *semilateres* that were embedded in the concrete like the teeth of a saw, with the hypotenuse of the triangle on the surface (see Fig. 5.8). When used for the arches of the rotunda, however, the sesquipedales and bipedales were usually employed either whole or as rectangular halves or smaller portions. In this context, individual bricks do not fit a perfectly radial pattern, but tapered bipedales usually alternate with ordinary ones for the sake of economy. The concrete consisted of mortar made of lime and pozzolana into which were laid, not poured, pieces of aggregate, often as large as a fist, made of stone (often tufa) and, to a lesser extent, pieces of broken brick. At intervals, the concrete is divided into horizontal sections by "through" or "bonding" courses made up of a single stratum of *tegulae bipedales*.

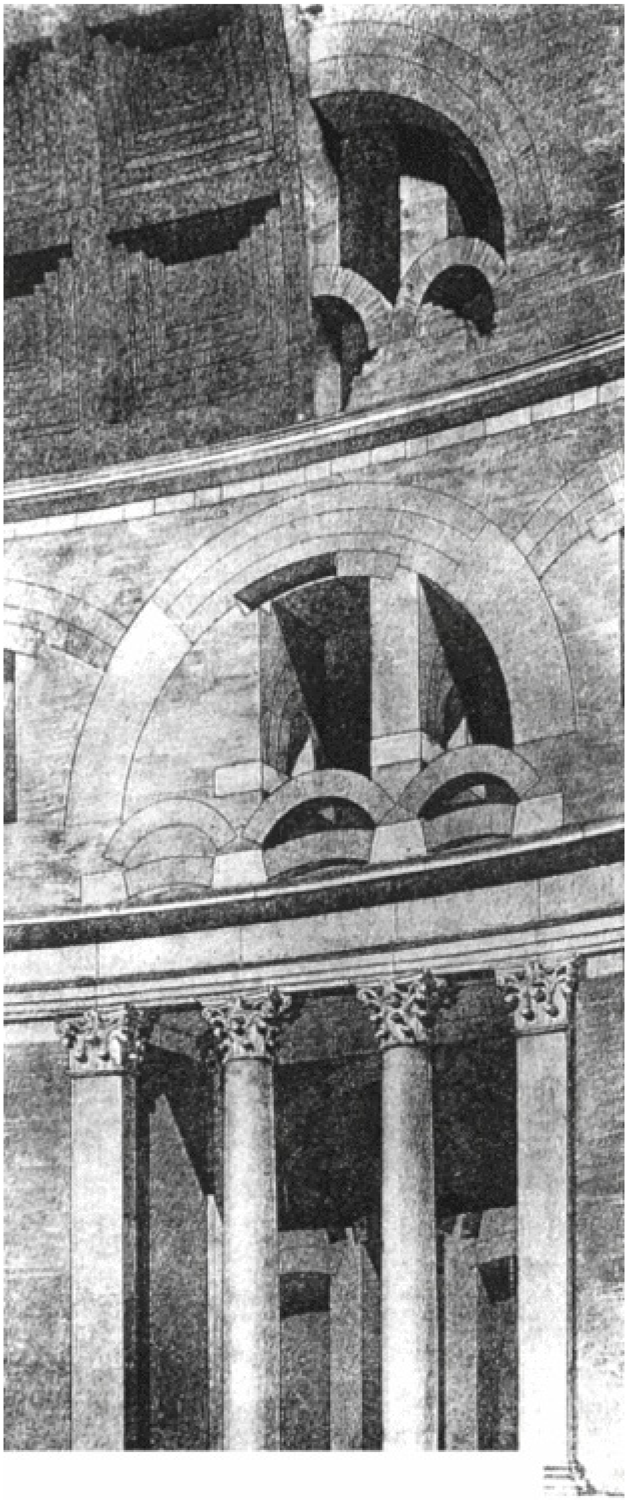


4.4. Study of structure in upper part of drum by Josef Durm. (Durm 1905, Fig. 641)

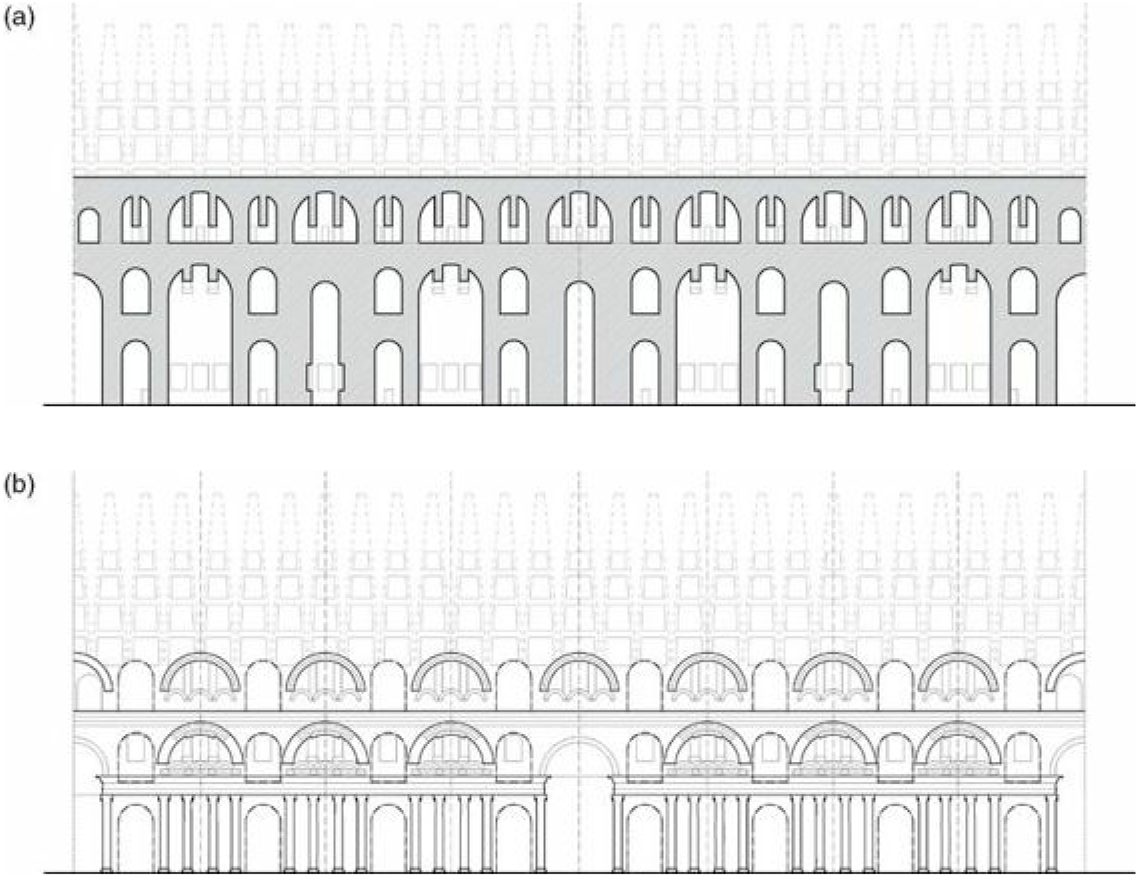
The outer face of the drum of the Pantheon has interlocking arches of two kinds, discharging and relieving. Discharging arches and relieving arches differ in that the first have an opening underneath, whereas the second have no opening or none visible at the surface. In their disposition, these arches may be likened to the wicker arches of a basket. The dome is like the upside-down basket seen on the top of the crane of the Haterii,[39] or like the baskets seen on the frieze of Trajan's Column used by Roman soldiers to transport earth, mortar, and *caementa*.

The relieving arches embedded in the body of the rotunda wall are made of bipedales, with a minority of sesquipedales in some cases. These tile-shaped bricks are arranged in one, two, or three superimposed concentric rings, depending on the strength required (Figs. 4.3 and 4.4). The relieving arches that form part of the eight piers have only one ring of bipedales on the ground-level tier; their

intrados correspond to the semidomes of the chambers within (see Fig. 1.13). The arches directly overhead have two rings of bipedales, again arranged to coincide with the chambers behind. The great relieving arches with triple rings (two of bipedales plus one of sesquipedales), also on the second level, correspond to the crown of the vaults over the exedrae; their internal diameter is 11.80 meters.[40] On the third story, arches with double bipedales relate to the barrel vaults of the top tier of chambers (Figs. 4.5 and 4.6).



4.5. Perspective rendering of the structure over an exedra of the rotunda. (Pier Olinto Armanini, in Beltrami 1898, Plate IV)

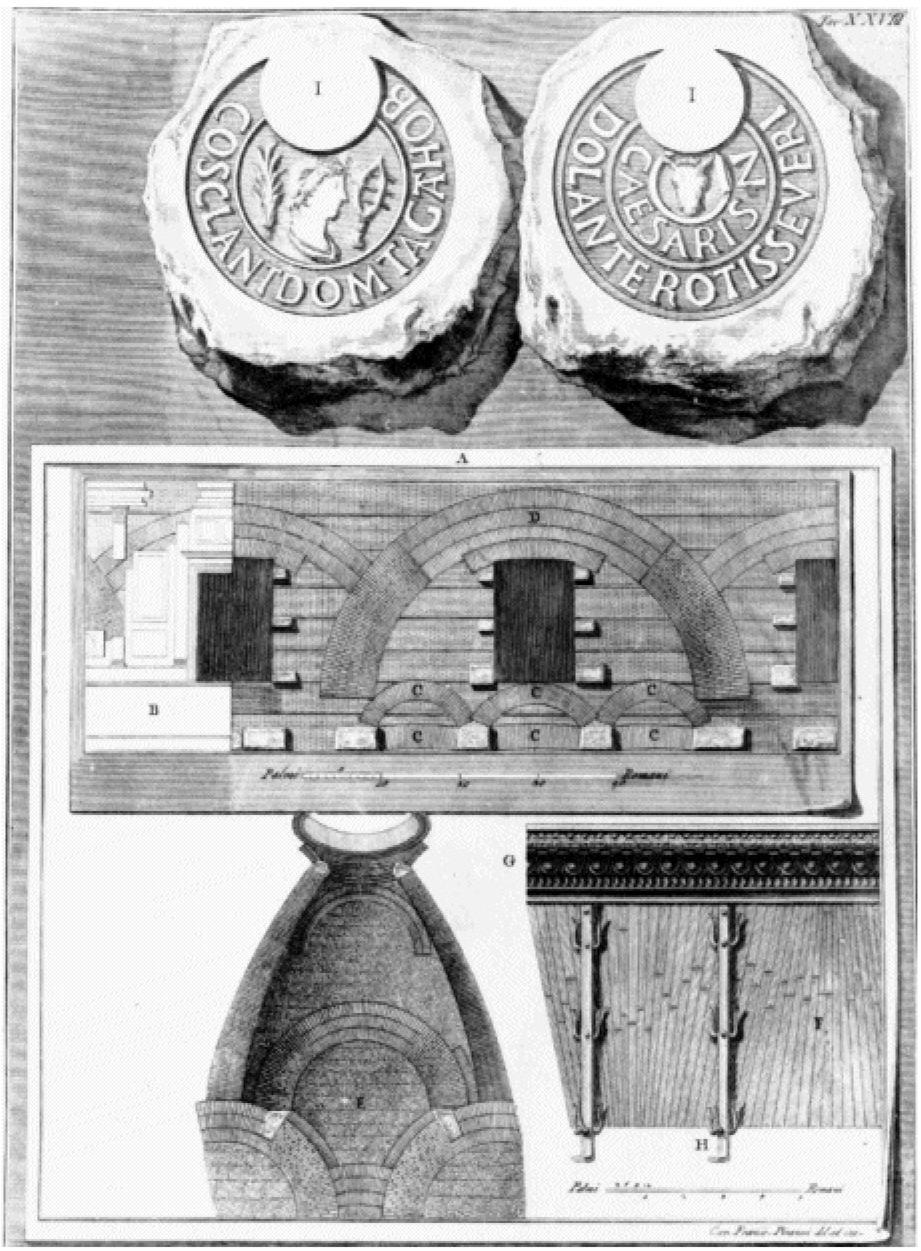


4.6. Interior elevations projected flat, showing the bare structure (a) and the structure in relation to principal marble elements (b). (Drawn for the author by Roberta Zaccara in 2007)

As just mentioned, the Romans did not generally build arches from whole sesquipedales or bipedales alone, but broke many of them in two for reasons of economy and for better bonding, with the nonbroken edges in view on the exterior faces. As Gene Waddell explains in Chapter Five, whole bipedales often alternate with portions of concrete in between that may be likened to *voussoirs*. This can be seen in many ruined Roman buildings, but we can be less sure of this aspect in the Pantheon because it is intact. We can only catch a glimpse inside of the barrel vaults through a few cracks in the dome. I have, however, been able to inspect a high-level chamber of the Basilica Neptuni, immediately to the south of the Pantheon. Where some of the linings have fallen off, it is possible to observe the structure behind. The visible surfaces are made up entirely of bipedales, without rubble, as suggested in the drawings by Joseph Durm (Fig. 4.4). Durm draws the ribs of the dome as if they were made of brick, but this is not certain because we do not see inside the arches. The impressive arches that once bridged the Pantheon and the basilica at high level are in any case definitely made of solid bipedales (see Fig. 7.5). Perhaps all third-story barrel vaults were built with a high density of bipedales and relatively little rubble.

The lower level of chambers in the piers open onto the exterior of the rotunda with apertures crowned by flat tile arches; above each of these there is a semicircular relieving arch (Fig. 4.3). The second-story chambers have no openings toward the outside, except for the ones that correspond to the stairs.[41] At the same time all of the chambers sit behind the blind attic windows. The third-story semicircular chambers have an outside aperture that is not in the center so as to avoid the radial wall that bisects them.

Inside the rotunda, the trapezoidal exedrae on the diagonal axes have barrel vaults, while the exedrae on the cross axes have semidomes. The extrados of both attain a level just beneath the springing of the cupola. The relation between the architectural volumes and the fabric at attic level can best be seen in drawings that relate to the works that Pope Benedict XIV authorized after the Jubilee of 1750 to repair damage to the interior of the dome, which had been caused by infiltration from rain. During 1756–1758, adjustable scaffolding was put up, and Giovan Battista Piranesi had an opportunity to make firsthand observations.[42] His studies were collated by his son Francesco (Fig. 4.7), which appeared as part of a set of engravings in 1790.[43] The upper part of the plate contains reproductions of two brickstamps from Hadrian's time, found in the dome.[44] In the center there is a drawing of the brickwork in the attic, which was temporarily visible on account of the removal of areas of defective covering. The attic wall has a continuous series of main and secondary relieving arches, relating to the exedrae and the piers, respectively. Under the intrados of each main arch there is a framework of minor arches. This system lightens the load while directing it over the columns below (Fig. 4.5).[45]



4.7. Engraving illustrating brick stamps (top), construction of attic level (middle), brick skeleton for a portion of the dome, and an elevation detail of the oculus (bottom) by Francesco Piranesi. (Rome 1790, Plate XXVIII)

The function of the relieving arches of the Pantheon, like those of numerous other Roman buildings, is rather enigmatic. Having been built over and filled with masonry, they cannot behave like real arches. What purpose, then, do they serve?

One of our sources for such arches is the sixth book of Vitruvius, on private buildings:

> Likewise, make certain that arches relieve the weight of the walls [*ut levent onus parietum fornicationes*] onto their voussoirs [*cuneorum divisionibus*], and that they are centered over the opening. For if arches spring from voussoirs that begin beyond the wooden beam or the head of a stone lintel, in the first place the wood will not bend because its load has been relieved, and secondly, if in time it begins to develop flaws, it can be replaced easily, and without piling up braces.[46]

Toward the end of the period of classical Roman architecture Procopius of Cesarea provides us with some interesting information on the construction of Hagia Sophia in Constantinople. He writes of the decision of the Emperor Justinian to complete one of the four main arches in the face of the danger that the centering would collapse:

> And the props [Greek*pessoi*], above which the structure was being built, unable to carry the mass which bore down upon them, somehow or other suddenly began to crack, and they seemed on the point of collapsing. ... And straightway the Emperor ... commanded them [Anthemius of Tralles and Isidorus] to carry the curve of this arch to its final completion. "For when it rests upon itself," he said, "it will no longer need the props [*pessoi*] beneath it."[47]

In 1985, I had new bipedales made for the restoration of arches in the Domus Tiberiana on the Palatine.[48] A dry bipedalis weighs 30 kilos but, when laid wet, and so much heavier due to water absorption, two bricklayers are required to shift it. As the wall dries, bipedales gradually release water, and this helps to even out the curing process and reduce the extent of shrinkage cracks. Due to the viscous quality of the mortar and the capillary nature of the terra-cotta, the union between wet bipedales and wet concrete is extremely strong. The porosity and surface area (0.36 m^2) of a bipedalis is far greater than ordinary bricks. As a matter of fact, when an arch is closed by laying the final, key bipedalis, even though the masonry of the arch is still wet it immediately acquires stiffness (which gradually increases as the mortar dries). Once the crown of the arch is in place, the weight on the props diminishes as the thrust on the haunches begins, just as described by Procopius of Cesarea.

It is also significant that the amount of mortar used with the bipedales is much less than in the main body of concrete, this being another reason why relieving arches gain strength more quickly. This made relieving arches particularly effective in terms of constructional procedure, since the centering could be struck earlier than otherwise would be the case. It can further be supposed that having the vaults gain their strength quickly would have been a great advantage for proceeding with the construction at a higher level.[49]

Relieving arches confer greater stiffness to a wall because an arch of bipedales is stiffer than an equal mass of either normal opus testaceum or concrete. And as Lynne Lancaster notes: "The idea of

using arches to control how a structure supports its load is related to the idea of reinforcing the parts of a building that support the greatest loads with the most durable materials."[50]

Furthermore, stress is placed along a line going from one extremity to the other, as in a bridge. This advantage is useful in cases of differential subsidence of the terrain under the foundations. Some of the cracking in the Pantheon is almost certainly due to settlement.[51] It can be surmised that Roman architects believed that such cracks, which slowly get bigger over the life span of a building, would be checked or even averted by the use of relieving arches.

Thus, we have seen how inside the drum, voids are overlaid by either semidomes or barrel vaults, which on the outside are echoed by series of relieving arches. Built on three levels, these trace the logic of the 20-foot-thick diaphragmatic structure: arch-pier-arch, like a bridge or an aqueduct (Fig. 4.6).[52] The voids give the structure lightness while the vaults in bipedales confer stiffness. The relieving arches brought advantages, too, in terms of both the performance of the structure and the speed with which it was put up.

About the Dome

Ammianus Marcellinus, describing a view of Rome during a visit by Costantius II in AD 357 expressed his admiration for the Pantheon: "The Pantheon is like a rounded city–district, vaulted over in lofty beauty."[53] This feat of engineering is underlined by the great weight of the masonry above the springing of the dome (shell of the dome + the third story of the drum), which, according to MacDonald, is about five thousand metric tons.[54] The wonder of the building also raises other questions: what theoretical notions lie behind the construction of the dome? What technical criteria were used? Were there any precedents?

A book written during the greatest period of Roman architecture is *The Mechanics* of Hero of Alexandria, mentioned earlier. It is not a treatise like Vitruvius's *De Architectura* but a textbook for students of architecture and engineering, which includes study exercises. It includes a foreword on geometry and kinematics, and describes lifting equipment for heavy weights on building sites and the straightening of a wall twisted by an earthquake.[55] The heavy weights to be lifted are columns and stone blocks of *opus quadratum,* and so the book is not concerned with constructions using mortar, brick, and caementa. Hero writes with precision, and his work contains a formula relating to inclined planes that was not improved upon until Galileo Galilei.[56] Unfortunately, we do not have an analogous source for the arch and the vault as yet, but Hero gives us an idea of Roman engineering science, which was evidently empirical but neither improvised nor approximate. We also know that Hero wrote a treatise *On Vaulting*, which was the subject of a commentary in the sixth century AD by Isidorus of Miletus, one of the architects of Hagia Sophia.[57] Hero and Isidorus lie at either end of five centuries of written tradition on building vaults.

According to Robert Mark, an important source of Roman engineers' knowledge was the observation of constructional failures – which may have been quite numerous – along with any remedies employed.[58] Theory, therefore, was based on observation of deformation, displacement, and collapse, as in modern limit analysis. Reading Hero, we can appreciate how the concept of statics was based on mechanics and, furthermore, how architectural techniques made use of experience from

a variety of other contexts including stone quarries, olive presses, and docks.

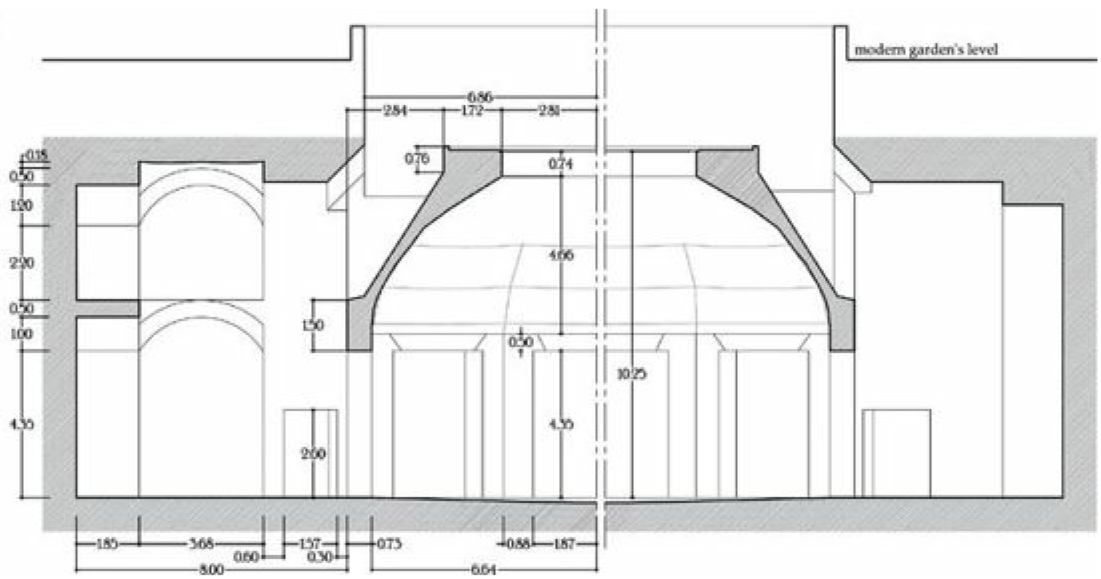
The biggest domes in the Roman world apart from the Pantheon have interior spans as follows:

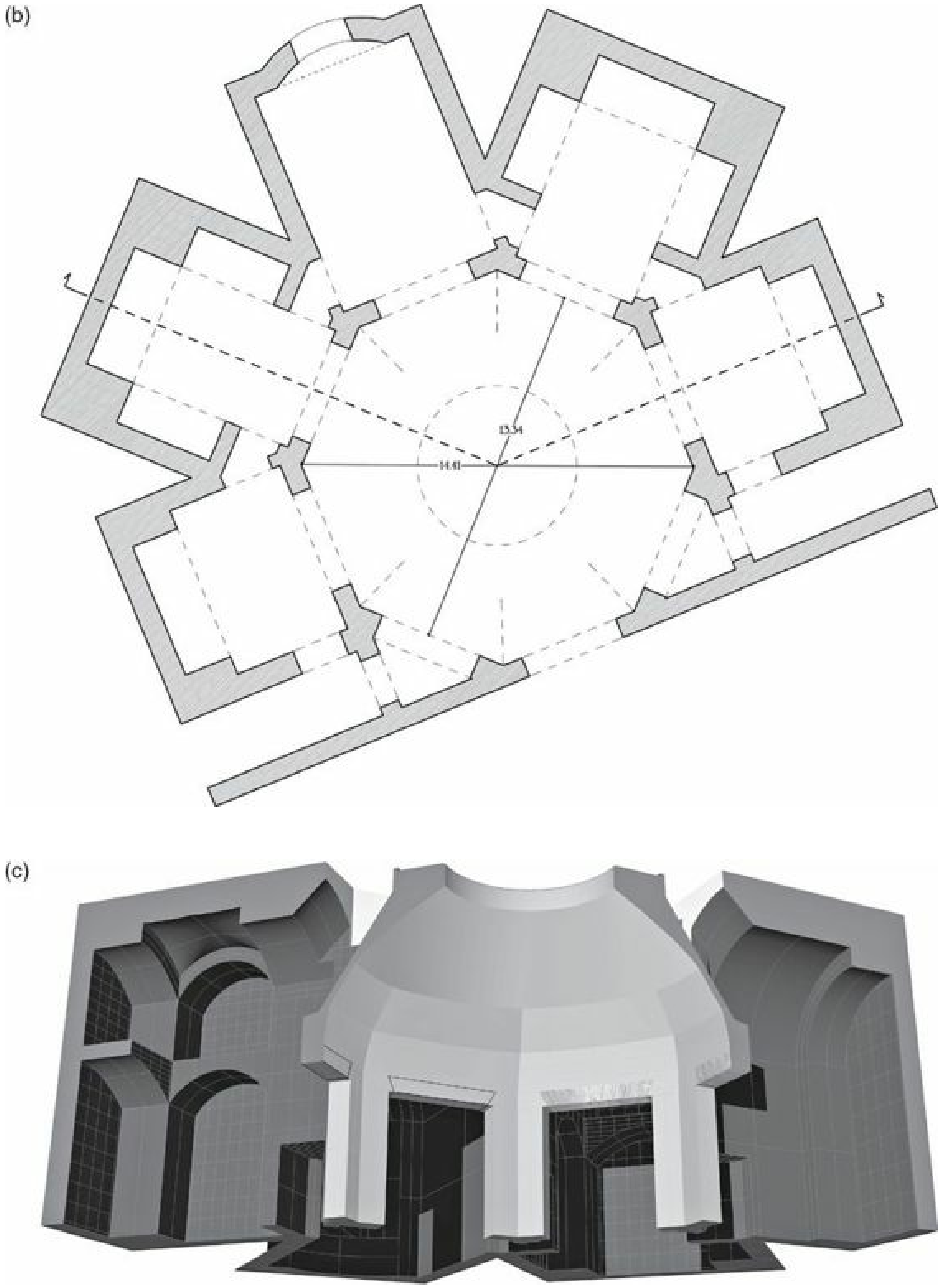
- The Temple of Mercury in Baiae, diameter 21.4 m
- Temple of Venus in Baiae, 26.2 m
- Temple of Diana in Baiae, 29.8 m
- Temple of Apollo at Lake Avernus, 35.5 m[59]
- Caldarium of the Baths of Caracalla, over 35 m.

Four of these buildings are located above Capo Miseno, near Naples, in the same volcanic region from which derived their function as part of thermal complexes. Furthermore, the common constructional feature is that all of these domes are made from light volcanic material.

A most unusual vault is that of the Octagonal Hall in Nero's Domus Aurea.[60] There is no comparison in size with the Pantheon because it has a diameter of only 13.35 meters. Yet it is worth dwelling on the Octagonal Hall because its vault is exceptional in the history of Roman architecture (Fig. 4.8, a, b, c).[61] The rotunda of the Octagonal Hall must have produced quite an effect on its privileged visitors. It was highly unusual in many ways beyond the extensive use of gilding,[62] but what would really have impressed Nero's guests was the way light was scooped in from above. This was something totally unexpected and must have produced great wonder: the walls were empty, whereas in other *rotundae* they were full; there was light where others were dark.

(a)





4.8. Section (a), plan (b), and model (c) by Filippo M. Martines of Octagonal Hall in the Domu Aurea, Rome. (Drawn for the author in 2005–2006)

The Neronian vault did not rest on a full drum but on an octagon with solid corners and oper walls. The vault is very slender, and where it does thicken toward the base this is not achieved by means of external concentric stepped rings. Despite these differences, some structural elements of the Octagonal Hall of the Domus Aurea are similar to those of the Pantheon. The dome rests on eigh piers, which are connected by a system of bipedales, that is, eight flat arches. The crown is lightened by an oculus 5.6 meters wide. Examination reveals that the concrete vault is formed by two different,

superimposed, geometrical figures, a calotte on top of a domical vault. In the lower half, eight webs, separated by clearly visible groins over the piers, spring from the eight flatarches. The calotte begins where the groins end. We have already mentioned that the dome of the Pantheon is also made up of two superimposed systems: eight barrel vaults over the third-story ring chambers supporting a calotte with an oculus. Thus the structural idea is similar to that of the Octagonal Hall.

The architects Severus and Celer, *magistri et machinatores*, built the Domus Aurea before AD 68; Tacitus praises their talents: "[T]hey had the ingenuity and the courage to test the force of art even against the veto of nature."[63] Contemporaries said that Nero's architects had surpassed nature in feats of construction, just as Parrasius had done in painting.[64] This marvel was no longer visible by the time the Pantheon was built. In fact, in AD 104 a great mound of earth sealed the *damnatio memoriae* of Nero and his Domus Aurea. But as the architect who, ancient sources tell us, was responsible for creating the Baths of Trajan, the complex that subsumed Nero's Domus into its massive substructures, Apollodorus of Damascus could have seen the renowned octagonal hall. What is more, he would have seen it without the decorations that camouflaged its constructive inventions when the Domus Aurea had been in use. In a highly original study in 1975, Wolf-Dieter Heilmeyer attributed to Apollodorus the design of the Pantheon as well. His hypothesis has found subsequent support and amplification (see Chapter Seven), though we still await definitive proof of it.[65]

MacDonald has suggested a comparison with another innovative piece of Roman vaulting:

> There is a certain similarity between the structure of the aula of the Markets of Trajan and that of the Pantheon in spite of the basic difference in plan. The abutting tabernae barrel vaults and the gallery arches of the aula appear at the Pantheon in a more complex arrangement, disposed around a central vertical axis.[66]

Nero's Octagonal Hall, the *aula* of the Markets, and the Pantheon share a static concept: central vault equilibrium is produced by a system of barrel vaults and abutments. This concept is different from the great domes of Baiae; it reminds us of the statics of gothic cathedrals. However, arches of bipedales in Roman vaults are not autonomous ribs but, as we have seen, are embedded in the concrete.[67]

Apollodorus's best-preserved work is Trajan's Column, the structure of which may be attributed to him as part of his authorship of Trajan's Forum as a whole.[68] The Column and the Pantheon are very different, yet they have similar characteristics. Firstly, they are gigantic, the biggest examples of their kind. Apollodorus's experience of large-scale structures also included authorship of Trajan's renowned bridge over the Danube.[69] The Column and bridge set two world records in vertical and horizontal dimensions.[70] The bearing structure of the Column is, like the drum of the Pantheon, a diaphragm (Fig. 4.2).

Both monuments are gigantic constructions with tiny passages (the spiral in the Column, the honeycomb in the drum). This relationship (giant building/tiny space) is mentioned in the *Poliorketica*, Apollodorus's treatise on siege warfare, in a passage describing the excavation of niches to undermine enemy walls.[71] Finally, with its height of approximately 130 Roman feet, without the statue,[72] the Column would fit neatly into the Pantheon, with its clear height of 147 feet. These observations are no proof for attributing the Pantheon to Apollodorus but they are indicators. Two

very different buildings use similar ideas. The architect of the Pantheon was certainly closer in artistic sensibility to Trajan's era than Hadrian's, and he must have seen the great construction sites at the beginning of the second century AD: the dome of the Venus' Temple in Baiae, and Trajan's Forum and Baths in Rome. On the basis of these indications, it may be assumed that he belonged to Apollodorus's circle if he were not indeed Apollodorus himself.

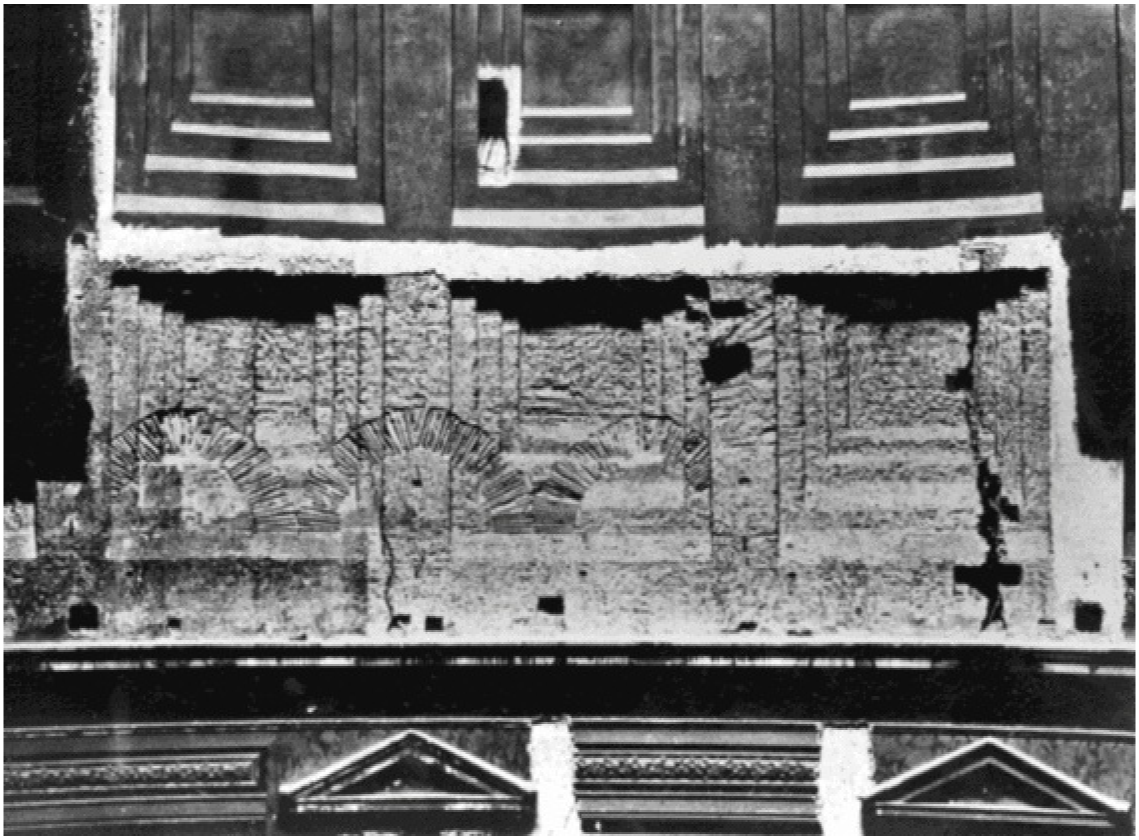
Beneath the Plasterwork of the Dome

Plaster covers the inside surface of the dome of the Pantheon, while the outside is protected by a dressing of lead that replaced the original system of bronze tiles. Unlike that of many other ancient domes, which lie in ruins, its structure cannot be directly observed. We must therefore rely on data from previous inspections to an even greater degree than for the drum, many parts of which are still accessible today.[73]

The earliest document we have is a drawing, U 69A, by Antonio da Sangallo the Younger, which shows a section of the Pantheon on the right, while on the left there are studies for Villa Madama and, below, for St. Peter's.[74] Antonio's interest in the construction of the Pantheon evidently sprang from his concerns for the building of St. Peter's, in which he had been involved since 1507, some years before he made this drawing. The study of the Pantheon highlights two important high-level structural elements, relieving arches at the internal springing of the dome and bonding courses (of bipedales) capping the arches.

Another valuable, if problematic, source of information is the set of drawings by Francesco Piranesi, mentioned earlier, that was based on the surveys made with his father, Giovan Battista. In the lower third of Piranesi's plate reproduced here as Fig. 4.7, on the left, the perspectival drawing is entitled "Dimostrazione dell'ottava parte della cupola, come si vede quando fu spogliata dell'antica intonacatura" (an eighth part of the dome viewed without the ancient plasterwork). The arches depicted at the bottom are the same as those drawn by Antonio da Sangallo the Younger. Above them Piranesi drew a system of ribs and compartments, which would have numbered eight in all. This engraving by Piranesi conditioned subsequent studies and publications on the Pantheon for over a century, but the web of arches above the first row is mere conjecture. As a matter of fact, subsequent inspections confirmed only the existence of the arches drawn by Sangallo. Piranesi's web reflected the building techniques of the 1700s but not the dome of the Pantheon.

In 1892–1893, the Italian government commissioned repair work to "some coffers near the springing of the dome, on the right of the main altar."[75] Scaffolding was installed up to eight meters above the level of the springing of the dome. In charge of operations were Giuseppe Sacconi and Luca Beltrami. The French architect Chedanne was given permission to make sketches of the dome from the scaffolding.[76] Beltrami discovered that the arches at the springing of the dome do not follow its spherical curvature but rise vertically. In fact, he made an opening for inspection in the concrete at the level of the second row of coffers. He found the brick key of the arch one and a half meters from the surface of the recessed central field of the coffer (Fig. 4.9).[77] In addition, he discovered 1) that the arches are built with two rings of bipedales; 2) that under each arch there are three minor arches, corresponding to the spacing between the Corinthian columns far below; and 3) that there are no other arches in the dome or ribs of the kind that Piranesi envisaged.[78]



4.9. Detail of dome intrados at the springing with plaster knocked off, 1892. (American Academy in Rome, Fototeca Unione, no. 3595)

Photographs show the ribs of the coffers without the plasterwork. Some are faced in brick, others appear to be concrete, but this aspect does not seem to have been adequately investigated (the brick may be modern). To return to the drawing on the bottom right of Piranesi's plate (Fig. 4.7), this shows a detail of the ring of bricks around the oculus. The bipedales are not arranged vertically but into flat arches. The veracity of this document has been confirmed by modern inspections and photographs, and a schematic drawing by Guglielmo De Angelis d'Ossat shows eight flat arches in all.[79] The oculus of the Tempio della Tosse in Tivoli has a similar arrangement; here, the flat arches push against each other with the springer bricks embedded like ribs in the concrete shell.[80]

The oculus was a structural device, too. Its rigid perimeter ring of bipedales acts like a boss in a vault or the keystone in an arch, except that in being a void, it simplifies the difficult problem of building the crown. Indeed, it replaces a stretch of vault 9.1 meters wide. Thus, the critical part of the dome is reduced to the portion from the top of the third story to the edges of the oculus (see Plate XI and Fig. 1.12).[81]

To conclude, investigation carried out under the plasterwork of the Pantheon dome has revealed a series of eight relieving arches resting on the exedrae; they rise vertically rather than following the curvature of the dome and are embedded in the concrete vault. These arches are actually the faces of the barrel vaults that cover the ring of chambers of the third story of the drum (Figs. 4.5 and 4.6). The tops of the arches rise to 8.4 meters above the springing of the dome. So the dome is embedded in the drum for almost 40 percent of its height, taken from the springing to the oculus. A further 25 percent of the height is masked on the exterior by the step-rings, and only from above that level does the dome correspond to a simple calotte. The dome embedded in the diaphragmatic drum was the architect's trick.

Materials

As in most construction in Rome, the mortar used is a mixture of lime[82] and *pozzolana*. This is a volcanic powder named after the town of Pozzuoli, between Naples and Baiae, while a similar material can also be found in Rome itself.[83] Vitruvius describes its exceptional qualities:

> There is also a type of powder that brings about marvellous things naturally. It occurs in the region of Baiae and in the countryside that belongs to the towns around Mount Vesuvius. Mixed with lime and rubble, it lends strength to all the other sorts of construction, but in addition, when moles [employing this powder] are built into the sea, they solidify underwater.[84]

Concrete made with pozzolana can cure without drying, even in water and in the absence of air. It is perfect, therefore, for walls of great thickness. To the mortar are added types of aggregate, such as brick fragments, tufa, and volcanic slag. On the basis of detailed inspections by Gioacchino De Angelis d'Ossat and other scholars, we know this material to be graded carefully for the sake of performance,[85] as illustrated in Figure 1.12 and summarized in words by Kjeld De Fine Licht:

> Up to 11.75 metres above the level of the springing the cupola is composed of layers of brick fragments set in mortar. Six through–courses of *bipedales*, which slope 1 in 10 inwards are set in this zone at irregular intervals. The unit weight of the mass of concrete is calculated to be about 1600 Kg/m^3. Above this there is a belt 225 cm high which at the top and bottom is delineated by courses of *bipedales*, and in this belt the layers of brick alternate with layers of tufa. In that section about 9 m high which makes up the top part of the cupola, there are alternating layers of light tufa and volcanic slag in blocks about 20 cm in size, the unit weight being 1350 Kg/m^3. ... The thickness of the cupola is reduced from about 590 cm at the foot to nearly 150 cm at the top.[86]

The distribution of the materials is an expression of a conscious and rational arrangement. The heavier brick and tufa with a greater resistance to stress is placed at the foot of the dome. Above this follow layers of filling of increasing lightness: *Cappellaccio*, *tufo giallo*, pumice, and volcanic slag.[87] Volcanic slag (or scoria), such as is used in the vaults of the Baths of Caracalla, is a light material that at first floats if immersed in water since it contains air pockets. The judicious use of volcanic slag reflects the building traditions of Baiae and its great domes. The benefits of this approach are threefold: 1) the weight of the material lessens as the structure rises; 2) this reduces compression on the underlying layers, and 3) this produces less thrust.[88]

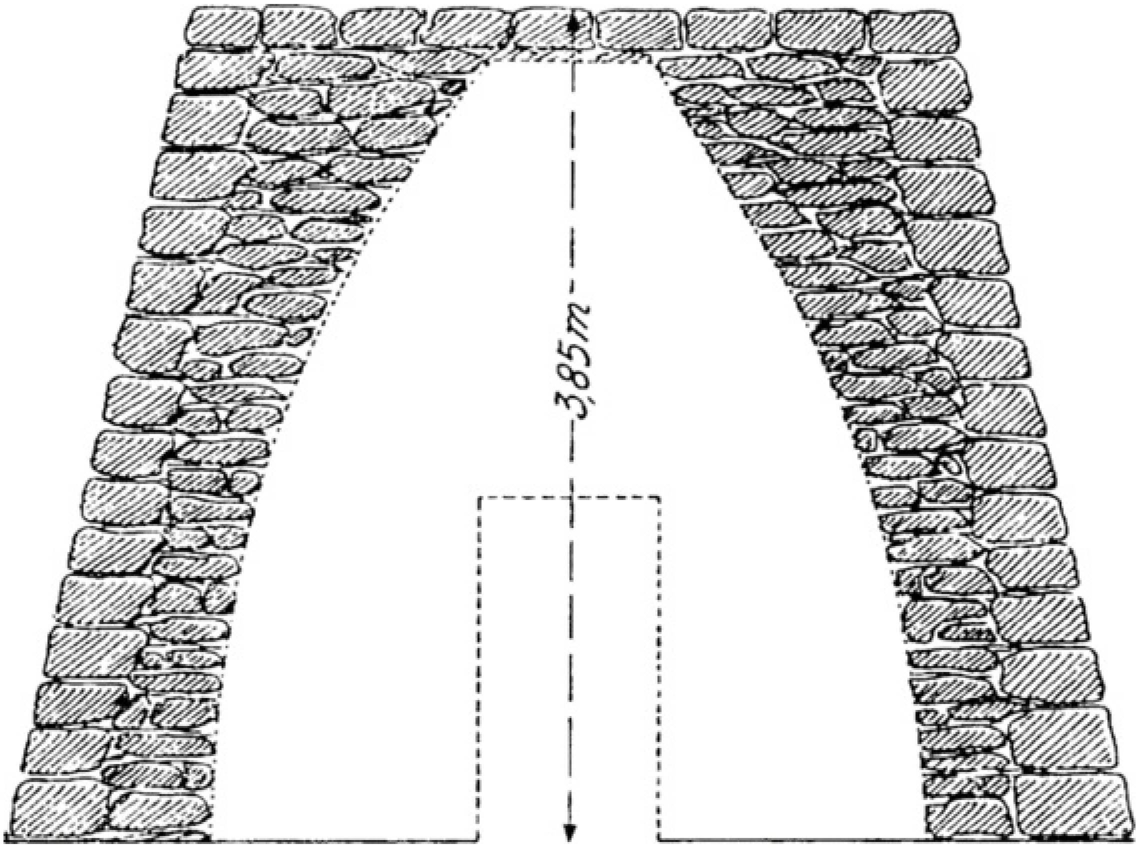
Masons' Criteria

In traditional Italian terminology, "*volta romana*," that is, Roman vault, means a vault filled with masonry from the intrados to the crown. This construction technique is completely different from that of medieval or Renaissance vaults, where the abutment is not made of concrete masonry but simple earth or rubble and the structure formed by voussoirs, or wedge-shaped stones. In medieval and

Renaissance vaults, the stones are, as a rule, arranged radially on a centering, so that each row of stones forms an arch or rib. The mass of earth filling on the extrados helps stability. On the other hand, in Roman concrete vaults, a radial alignment of aggregate in sympathy with the curvature is rare. It is found in the dome of the Temple of Mercury in Baiae,[89] the barrel vaults of the Sanctuary of Fortuna Primigenia in Praeneste, and the Temple of Hercules in Tivoli.[90] The stones, or caementa, of Roman vaults are generally arranged in horizontal layers, even where they run up against the centering. This is the case in the original vaults on the radial *cunei* of the Colosseum, in the Domus Aurea, and in many other ruins.[91] For us today, this arrangement seems illogical because the caementa do not follow the curvature or the stress flow. The method is, in fact, more reminiscent of corbeling techniques, as noted by Gustavo Giovannoni:

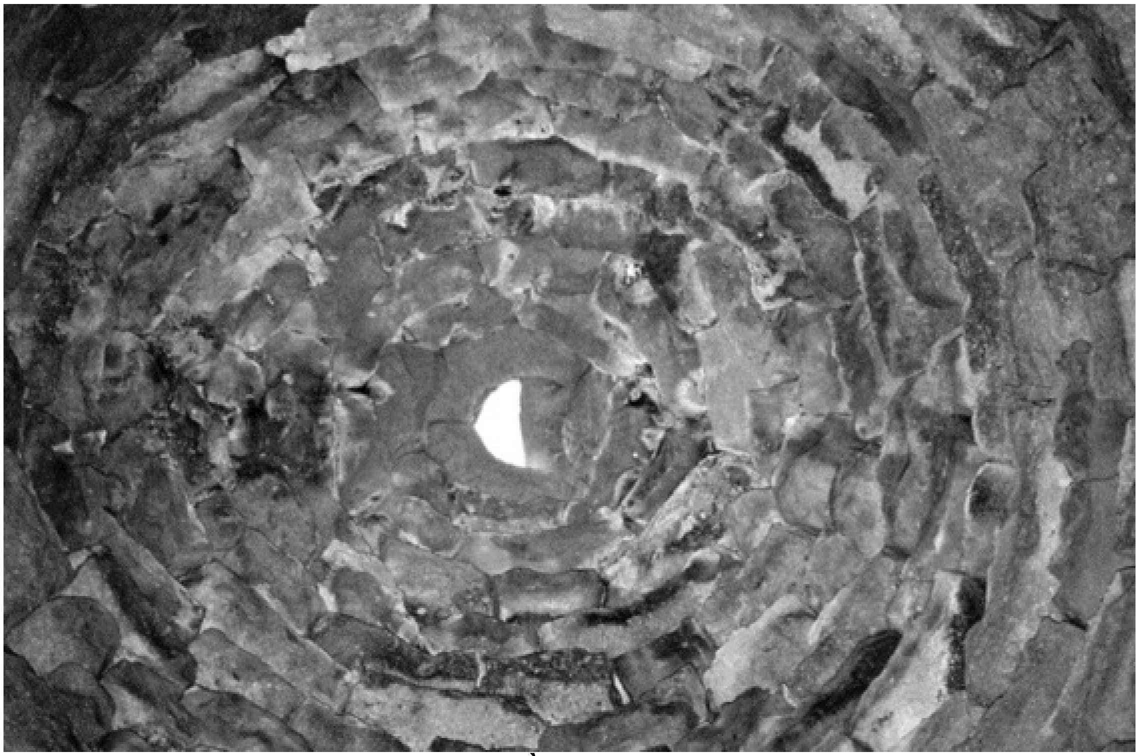
> As a construction concept, a vault of horizontal concrete layers ... is far removed from a voussoir vault of cut stone. Indeed, it seems to bear greater resemblance to the Mycenaean false dome, made with horizontal stones, that is, by corbelling layers inwards like cantilevers on rings below.[92]

Studies by Rowland Mainstone come to similar conclusions.[93] The principle of corbeling can be seen in certain types of vault indigenous to the Mediterranean. In Apulia, in southeast Italy, the *casella*,[94] or *casiddu* (Fig. 4.10), is a kind of beehive house “built of rough stones set in projecting courses to form a dome.”[95] Similar shelters are also found in Liguria, the island of Minorca, and the Basque region.[96] The *casiddi* and the *trulli* in Apulia go back to the sixteenth century and are built without any mortar. But the tradition goes back to former times. Another very ancient building type similar to the casiddu is the cyclopean nuraghe, built in Sardinia from circa 1800 BC until ancient Roman times.[97] Aristotle mentions such constructions in a minor work entitled *On Marvellous Things Heard*: “In the island of Sardinia they say that there are many fine buildings arranged in the ancient Greek style, and among others domed buildings (Greek *tholos*), carved with many shapes.”[98]



4.10. Section through a *casiddu* near Santa Cesarea Terme, Puglia. (Gerhard Rohlfs, *Primitive costruzioni a cupola in Europa*, Florence 1963, Fig. 4)

The largest nuraghe corbel vault, Is Paras (fifteenth century BC) located in Isili near Barúmini, has a span of 6.4 meters and a height of 11.8 meters, and inside the corbel vault is made by 37 rows of rough stones (Fig. 4.11). It is reminiscent of the "Treasury of Atreus" in Mycenae, a *tholos* of the Greek Bronze Age (thirteenth century BC), except that this has a far greater extension: a 14.5 meter span and a height of 13.2 meters, while inside the false dome is constructed by 33 rows of much larger hewn blocks. In terms of size, this bears comparison with the domical vault of the Octagonal Hall, which spans 14.40 meters at the diagonal and rises 10.25 meters on the extrados. Tholos-type structures can also be seen in other Mediterranean lands and civilizations. The stonework of the Etruscan "Tomba dei Carri" in Populonia (seventh century BC) is quite remarkable.[99]



4.11. Nuraghe "Is Paras," near Ìsili, Sardinia, detail of corbeled dome. (Photo author)

Just as props and centering were not needed to construct any of these structures mentioned, the same could be the case for the lower portions of the dome of the Pantheon. Here, the horizontal layers of mortar with tufa and brick fragments were built up as a series of corbels in structural terms, while the profile would probably have been defined by a system of wooden boards tied back to the intrados. There was no need for solid props beneath for this, the lower part of the dome.

To be more specific, the method of progressive corbeling, without props, would have encompassed an angle of approximately 40 degrees to the center of the sphere (see Fig. 7.4), that is to say, up to a height of 14 meters from the springing of the cupola, with an overhanging span of more than 5 meters or so.[100] Since the oculus did away with any structure for the central portion of the dome, only the "doughnut-shaped" portion that lies inside the step-rings would have been built on solid scaffolding centering. In this area, the slope of the dome becomes impracticable for corbeling, while the mixture of volcanic slag, yellow tufa, and pumice cannot exercise thrust before the mortar has completely dried and set. The calotte requiring centering thus measures a rise of 7.4 meters and a span of 12.2 meters. Leaving aside proposals for flying centering favored by Eugène-Emmanuel Viollet-le-Duc,[101] Jean Pierre Adam, and others (see Fig. 7.3),[102] Licht concludes that "only the topmost part of the cupola presumably required a more extensive scaffolding".[103] This view was held by De Angelis d'Ossat and more recently by Lamprecht and Lancaster;[104] Gene Waddell, Mark Wilson Jones, and I are all in agreement on this point. In his recent book on the Pantheon worksite Gerd Heene comes to similar conclusions.[105]

What relationship is there, then, between the false dome of a casiddu, or ancient beehive house, and the dome of the Pantheon? Is one the forerunner of the other, preserving traces of its genetic heritage? This relationship can better be illuminated by applying Claude Lévi-Strauss's famous comparison of "the engineer and the *bricoleur*" in *La pensée sauvage*.[106] Enrico Comba outlines Lévi-Strauss's concept:

> A bricoleur is a person who can use whatever is at hand to produce something that serves a purpose. Unlike an engineer, he does not have to use specific raw materials or expressly conceived instruments to carry out a task. ... 'La pensée sauvage' (The savage mind) is not primitive or archaic nor does it correspond to a rudimentary state of scientific thought, but is parallel to it. These two forms of thought often coexist and differ only in the way they apply data deriving from experience to build an ordered coherent system of things.[107]

Modern studies on the statics of vaults have distanced us from "the science of the concrete," to use another expression of Lévi-Strauss.[108] As far as vaults are concerned, this came about during the Enlightenment when a distinction started to develop between intellectual science and "concrete science." In Roman architecture, this "concrete science" was a combination of refined design, of which we have some knowledge of principles,[109] and the empiricism of bricklayers, the cognition of which we have lost through lack of experience. Roman construction is a wonderful example of this marriage between the engineers and the bricoleurs.

This study is dedicated to the memory of Professor William Melczer, of Syracuse University, New York, who taught me the importance of objectivity in research work, during the many visits we made between 1983 and 1995 to the monuments of ancient Rome in the company of students.

I would like to thank Giovanni Belardi, director of the Pantheon, of the Soprintendenza per i beni architettonici ed il paesaggio di Roma. Many thanks are also due to Mr. Fred Moffa of the British Institute of Rome, for his care and attention in the translation of this work, and to Cinzia Conti of the Soprintendenza Archeologica di Roma for her help with discussing many questions raised in this study. A special thank you to Mark Wilson Jones for taking my first manuscript to pieces and reassembling it in an improved sequence.

1 Mark Wilson Jones, *Principles of Roman Architecture*, New Haven 2000.

2 A. Palladio, *I quattro libri dell'architettura*, Venice 1570, vol. 4, p. 73.

3 Giangiacomo Martines, "Argomenti di geometria antica a proposito della cupola del Pantheon," *Quaderni dell'Istituto di Storia dell'Architettura* 13, 1989, pp. 3–10; M. Pelletti, "Note al rilievo del Pantheon," *Quaderni dell'Istituto di Storia dell'Architettura* 13, 1989, pp. 10–18. In 2005, the Karman Center for Advanced Studies in the Humanities at the University of Bern conducted a new digital survey.

4 Vitruvius, 5.10.5 (*Vitruvius: Ten Books on Architecture*, trans. Ingrid D. Rowland, commentary

and illustrations by Thomas Noble Howe with additional commentary by Ingrid D. Rowland and Michael J. Dewar, New York 1999, p. 72).

5 L. Crema, *L'architettura romana,* Turin 1959, p. 376.

6 Mark Wilson Jones, "Principles of Design in Roman Architecture: The Setting Out of Centralised Buildings," *Papers of the British School at Rome* 57, 1989, pp. 106–151.

7 T. L. Heath, *The Works of Archimedes: On the Sphere and Cylinder* I, Proposition 34, Cambridge 1897; M. Clagett, *Archimedes in the Middle Ages*, 5 vols.,Madison-Philadelphia, 1964–1984; Carl Boyer, Uta Merzbach, and Isaac Asimov, *A History of Mathematics*, New York 1989; A. Frajese, *Opere di Archimedes*, Turin 1974; Archimedes, *The Works: 1. The Two Books on the Sphere and the Cylinder, with Eutocius' Commentaries*, third century BC, ed. and Eng. trans. R. Netz, Cambridge 2004. The notation π is recent and dates back only to the seventeenth century. This is the initial letter of the Greek word *periphéreia,* i.e., "circumference."

8 Frajese 1974, pp. 51–60. See also Heath 1921; T. L. Heath, *The Thirteen Books of Euclid's Elements*, New York 1956; A. Frajese and L. Maccioni, *Gli Elementi di Euclide,* Turin 1970.

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10 Wilson Jones 2000, pp. 40–43; P. Gros, "Les fondements philosophiques de l'harmonie architecturale selon Vitruve," *Aesthetics: Journal of the Faculty of Letters, Tokyo University* 14, 1989, pp. 13–22.

11 Heath 1897; E. J. Dijksterhuis, *Archimedes*, Copenhagen 1956, p. 142.

12 Frajese 1974, p. 23.

13 Cicero, *Tusculanae Disputationes*, 5. 23 (trans. J. E. King, Cambridge 1960).

14 Dijksterhuis 1956, pp. 313–314.

15 J. L. Heiberg, "Eine neue Schrift des Archimedes,"*Bibliotheca Mathematica* 7, 1906–1907. In 1906, Heiberg discovered in the monastery of the Holy Sepulchre in Jerusalem a tenth-century manuscript copy of Archimedes' *Method*, overwritten with prayers in the thirteenth century.

16 Hermann Schöne, *Herons von Alexandria Vermessungslehre und Dioptra Griechisch und Deutsch*, Leipzig 1903, p. 80 line 17, p. 84 line 11, p. 130 lines 15 and 25. *Method* translates the Greek word *ephodikón*, i.e. "system."

17 C. M. B. Carra de Vaux, "Les Mécaniques: ou l'élévateur de Héron d'Alexandrie," *Journal Asiatique* 1893, vol. 1, pp. 386–472; 1893, vol. 2, pp. 152–192, 227–269, 461–514; Hero Alexandrinus, *Mechanica,* ca. AD 50, ed. L. Nix and W. Schmidt, Leipzig 1900; Drachmann, *The Mechanical Technology of Greek and Roman Antiquity*, Copenhagen 1963; G. Di Pasquale, *Tecnologia e meccanica. Trasmissione dei saperi tecnici dall'età ellenistica al mondo romano*, Florence 2004. For the date, see Otto Neugebauer, "Über eine Methode zur Distanzbestimmung Alexandria-Rom bei Heron," *Det. Kongelige Danske Videnskabernes Selskab. Historik-filologiske Meddelelser* 26.2, 1938, pp. 21–24.

18 Wilson Jones 1989b, p. 129; Gert Sperling, *Das Pantheon in Rom*, Neuried 1999; Wilson Jones 2000, pp. 184–187. Cf. H. Geertman, "Aedificium Celeberrimum: studio sulla geometria del Pantheon," *Bulletin Antieke Beschaving* 55, 1980, pp. 203–229.

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20 M. L. D'Ooge, *Nicomachus of Gerasa: Introduction to Arithmetic*, New York 1926; J. Bertier, *Nicomaque de Gérase*, *Introduction arithmétique*, Paris 1978; W. Haase, *Untersuchungen zu Nikomachos von Gerasa*, Ph.D. diss., University of Tübingen 1982.

21 *Nicomaque de Gérase*, 1.3.6. See Martines 1989.

22 Wilson Jones 2000, pp. 193–196; Martines 1989, p. 8.

23 Wilson Jones 2000, pp. 182–196. For contrasting interpretations at times, see F. Esposito and A. Michetti, "I criteri di dimensionamento degli organismi a cupola presso i romani, III," *Materiali e Strutture*. *Problemi di conservazione* 2, 1996, pp. 61–84; Sperling 1999.

24 V. Hoffmann, ed., *Der geometrische Entwurf der Hagia Sophia in Istanbul. Bilder einer Ausstellung*, Bern 2005.

25 Procopius of Caesarea, *De aedificiis*, 1.1.29 (*On Buildings*, trans. H. B. Dewing and G Downey, Cambridge 1971, p. 17).

26 Adam Ziolkowski, s.v."Pantheon," in E. M. Steinby, ed., *Lexicon Topographicum Urbis Romae*, vols. 1–5, Rome 1995–1999; vol. 4, Rome 1999, pp. 58–59.

27 Luca Beltrami, *Il Pantheon rivendicato ad Adriano 117–138 d.C.,* Milan 1929, pp. 35–37.

28 William L. MacDonald, *The Pantheon: Design, Meaning, and Progeny,* London 1976, p. 33.

29 MacDonald 1976. Diameter of oculus from Pelletti 1989.

30 For the ratio of span to wall thickness, see S. Huerta, *Arcos, bóvedas y cúpulas. Geometria y equilibrio en el cálculo tradicional de estructuras de fábrica*, Madrid 2004, p. 3; Janet DeLaine, *The Baths of Caracalla in Rome: A Study in the Design, Construction, and Economics of Large Scale Building Projects in Imperial Rome* (*Journal of Roman Archaeology*, Supplement 25), Portsmouth, RI, 1997, pp. 56–57; Wilson Jones 2000, p. 82; Lynne Lancaster, *Concrete Vaulted Construction in Imperial Rome: Innovation in Context*, Cambridge 2005, pp. 138–148. Dome span from Pelletteri 1989, p. 12.

31 C. Hülsen, *Il libro di Giuliano da Sangallo: codice Vaticano Barberiniano latino 4424*, Leipzig 1910, repr. Vatican City 1984, fol.13; cf. S. Borsi, *Giuliano da Sangallo. I disegni di architettura e dell'antico*, Rome 1985, pp. 94–95.

32 Sebastiano Serlio, *Il Terzo libro dell'architettura*, Venice 1540, p. 2v.

33 Ziolkowski 1999, p. 59.

34 Giangiacomo Martines, "La struttura della Colonna Traiana: un'esercitazione di meccanica alessandrina," *Prospettiva* 32, 1983, pp. 60–71; Martines, "L'architettura," *Autour de la colonne Aurélienne. Geste et image sur la colonne de Marc Aurèle à Rome*, ed. J. Scheid and V. Huet, Paris 2000, pp. 19–88.

35 H. von Hesberg and S. Panciera, *Das Mausoleum des Augustus. Der Bau und seine Inschriften*, Munich 1994; G. Ortolani, "Ipotesi sulla struttura architettonica originaria del Mausoleo di Augusto," *Bullettino della Commissione Archeologica Comunale di Roma* 105, 2004, 197–222.

36 A. M. Colini, *Storia e topografia del Celio nell'antichità* (Memorie dell'Accademia Pontificia 3), Vatican City 1944.

37 C. F. Giuliani, *Tibur I,* Rome 1970; C. F. Giuliani and P. Verduchi, "Villa Adriana," *Quaderni dell'Istituto di Topografia Antica della Università di Roma* 8, 1975; C. F. Giuliani, "Volte e cupole a doppia calotta," *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung* 82, 1975, pp. 329–342; William L. MacDonald and John Pinto, *Hadrian's Villa and Its Legacy*, New Haven 1995. See also Chapter Five in this volume.

38 G. Lugli, *La tecnica edilizia romana*, Rome 1957; C. F. Giuliani, *L'edilizia nell'antichità*, 1990; R. Taylor, *Roman Builders,* Cambridge 2003; Lancaster 2005. *Opus testaceum* normally refers to a construction by fired bricks; *testa* in Latin is an object made from clay and baked in an oven. Instead, *opus latericium* refers to a construction made of unfired bricks, which are dried or sunbaked, see Lugli 1957; G. Martines, "Mattoni romani da cortina," in G. Carbonara, ed., *Trattato di restauro architettonico*, Turin 1996, vol. 3, pp. 213–221. For illustrations, see Chapter Five in this volume.

39 Giangiacomo Martines, "Macchine da cantiere per il sollevamento dei pesi, nell'antichità, nel Medioevo, nei secoli XV e XVI," *Annali di architettura* 10/11, 1998–1999, pp. 261–275.

40 The sizes of bipedales and sesquipedales that make up the arches on the Pantheon's drum were checked with a laser system in 2005 by the architects Benedetto Brattoli and Marco Brunori, whom I gratefully thank for their help.

41 The stairs between the portico and the rotunda give access to a pair of semicircular chambers on the third level, corresponding to the second story of the rotunda (see Chapter Seven). The other semicircular chambers at this level are presumed to be the same.

42 Susanna Pasquali, *Il Pantheon: architettura e antiquaria nel Settecento a Roma*, Modena 1996.

43 Francesco Piranesi, *Seconda parte de' templij antichi che contiene il celebre Pantheon,* Rome 1790, Plate XXVIII. The system of arches and ribs supposedly embedded in the dome shown in the bottom left of the plate was redrawn by Auguste Choisy (*L'art de bâtir chez les Romains*, Paris 1873, Fig. III).

44 The two brickstamps were found during works to the ancient windows of the attic. After their discovery, the brickstamps were sold to antique dealers; see Pasquali 1996a, p. 128. The first brickstamp (*Corpus Inscriptionum Latinarum*, XV, no. 276), transcribed incorrectly by Piranesi, reads "Rosciani Domit(ii) Agathob(uli)." The second is CIL XV no. 811b.

45 Lancaster 2005, pp. 97–101.

46 Vitruvius 6.8.3.

47 Procopius, 1.1.69–71. See also Robert Ousterhout, *Master Builders of Byzantium*, Princeton 1999.

48 Martines 1996, p. 228; A. Giuffré and G. Martines, "Domus Tiberiana: dissesti antichi e provvedimenti nuovi," *Il Palatino area sacra Sud-Ovest e Domus Tiberiana*, ed. C. Giavarini, Rome 1998, pp. 409–426. In 1858, the architect Francesco Fontana had new bipedales made just for the Pantheon's restoration; see P. d'Orsi, "Pantheon, Portico degli Dei Consenti, Colosseo. Tre monumenti antichi restaurati a metà Ottocento," *Ricerche di Storia dell'Arte* 52, 1994, pp. 72–77.

49 DeLaine 1997, p. 164; Lancaster 2005, p. 98. C F. Giuliani 1990, p. 83; Lynne Lancaster, "Building Trajan's Markets 2: The Construction Process," *American Journal of Archaeology* 104, 2000, pp. 755–785; Giangiacomo Martines, "La struttura del Pantheon velut regionem fornicatam," *Quaderni dell'Istituto di Storia dell'Architettura* 41, 2004, pp. 3–16.

50 Lancaster 2005, pp. 86–87. On the phases of execution of a relieving arch, see R. Volpe, "Un antico giornale di cantiere delle terme di Traiano," *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung* 109, 2002, pp. 377–394. Cf. E. Bianchi, "Le nervature nelle volte massive di età romana," *Bullettino della Commissione Archeologica Comunale di Roma* 101, 2000, pp. 105–162.

51 G. Croci, *The Conservation and Structural Restoration of Architectural Heritage*, Boston 1998, p. 125. According to Croci 1998, p. 211, and G. Croci, *Conservazione e restauro strutturale dei beni architettonici*, Turin 2001, p. 461, compression vertical stresses at the springing of the dome are less than 0.5 MPa while tensile annular stresses are less than 0.05 MPa (MPa stands for the Mega Pascal, a unit that corresponds to 10 Kg/cm^2). According to R. Mark, "Reinterpreting Ancient Roman Structure," *American Scientist* 75, 1987, p. 146, the maximum levels of compression stress could rise to about 0.3–0.6 MPa around the wall openings of the drum. According to Kjeld De Fine Licht, *The Rotunda in Rome: A Study of Hadrian's Pantheon*, Copenhagen 1968, p. 92, the pressure on the top of the foundation is 0.45 MPa and on the ground 0.52 MPa. See also G. Croci, M. Cerone and A. Viskovic, "Analysis from an Historical and Structural Point of View of the Domes of Pantheon, Hagia Sophia and St Peter," *Studies in Ancient Structures*, ed. G. Özsen, Istanbul 1997, pp. 295–304.

52 Figures 4.6a and 4.6b were created for the author by architect Roberta Zaccara, to whom I am most grateful, on the basis of Pelletti 1989, Fig.7, and Wilson Jones 2000, Fig. 9.21a. The idea for

Figure 4.6a I owe to the architect Hyppolita D'Ayala Valva, whom I thank for showing me drawings from her degree thesis.

53 Ammianus Marcellinus, *Rerum gestarum libri*, 16.10.14, fourth century AD (trans. J. C. Rolfe Cambridge 1956).

54 William L. MacDonald, *The Architecture of the Roman Empire*, vol. 1: *An Introductory Study,* London 1965, 2nd ed. rev. New Haven 1982, p. 109.

55 Martines 1998–1999. *The Mechanics* has reached us in its entirety only through copies made by Islamic writers, and it only became accessible after the late nineteenth-century French translation by Baron Carra de Vaux of 1893.

56 M. Clagett, *The Science of Mechanics in the Middle Ages*, Madison 1959.

57 Archimedes repr. 2004, trans. Netz, p. 290. See also G. Downey, "Byzantine Architects: Their Training and Methods," *Byzantion* 18, 1946–1948, pp. 99–118; A. Cameron, "Isidore of Miletus," *Greek, Roman, and Byzantine Studies* 30, 1990, pp. 103–127. Probably we can see other clues of Hero's *On Vaulting* in Hero's *Stereometrica*, for which see *Heronis Alexandrini Opera quae supersunt omnia*, vol. V: *Heronis quae feruntur et de mensuris*, ed. J. L. Heiberg, Leipzig 1914 (repr. Stuttgart 1976), pp. 105–119; E. M. Bruins, *Codex Constantinopolitanus Palatii Veteris N.1,* Leiden 1964, pp. 139–147. For a synthesis, see Ousterhout 1999, pp. 70–76. See also Giangiorgio Martines, "Isidore's Compass. A Scholium on Hero's Treatise on Vaulting," *Nuncius* 29, 2014, pp. 279–311.

58 R. Mark and P. Hutchinson, "The Structure of the Roman Pantheon," *Art Bulletin* 78, 1986, pp. 24–34; Mark 1987.

59 Guglielmo De Angelis d'Ossat, "La forma e la costruzione delle cupole nell'architettura romana," *Atti del III Congresso Nazionale di Storia dell'Architettura*, Rome 1938, pp. 223–250; repr. in *Realtà dell'architettura. Apporti alla sua storia 1933–1978: Guglielmo De Angelis d'Ossat*, ed. L. Marcucci et al., Rome 1982, pp. 53–77. De Angelis d'Ossat dates the construction of the Temple of Diana to the time of Alexander Severus (222–235 BC). M. Borriello and A. D'Ambrosio, "Baiae-Misenum," *Forma Italiae Regio I,* p. 14, Florence 1979; S. De Caro and A. Greco, *Campania*, Bari 1981; Jean-Pierre Adam, *La construction romaine. Matériaux et techniques*, Paris 1984; Friedrich Rakob, "Römische Kuppelbauten in Baiae. Die Gewölbeprofile," *Mitteilungen des Deutschen Archäologischen Instituts Römische Abteilung* 95, 1988, pp. 257–301.

60 Laura Fabbrini, s.v. "Domus Aurea: il palazzo sull'Esquilino," in Steinby 1995–1999, vol. 2

1996, pp. 56–63; H. Prückner and S. Storz, “Beobachtungen im Oktagon der *Domus Aurea*,” *Mitteilungen Deutschen Archãologischen Instituts, Römische Abteilung* 81, 1974, pp. 323–339; Larry F. Ball, *The Domus Aurea and the Roman Architecture Revolution*, Cambridge 2003, pp. 207–218.

61 G. Giovannoni, “La cupola della *Domus Aurea* neroniana,” *Atti del Congresso Nazionale di Storia dell'Architettura*, Rome 1936, pp. 3–6; Ball 2003, pp. 207–218; Lancaster 2005, pp. 42–43. The three-dimensional model reproduced here was created for the author by Filippo M. Martines, from his original survey, in 2006.

62 Suetonius, *Nero* 31. See David Hemsoll, “The Architecture of Nero's Golden House,” *Architecture and Architectural Sculpture in the Roman Empire*, ed. M. Henig, Oxford 1990, pp. 10–36; Ball 2003, p. 208, p. 218 and fig. 79; Lancaster 2005, pp. 42–43; Giorgio Rocco, “Alcune osservazioni sul valore architettonici dell'antica decorazione parietale: la *Domus Aurea* di Nerone,” *Palladio 1*, June 1988, pp. 121–134. Further information is emerging from the ongoing restoration works on the Octagonal Hall under the direction of Cinzia Conti of the Soprintendenza Archeologica di Roma.

63 Tacitus, *Annales*, 15.42 (*The Histories and the Annals*, trans. Clifford Moore and John Jackson, repr. London 1956, p. 279).

64 Pliny the Elder, *Naturalis Historia*, 35.65.

65 Wolf-Dieter Heilmeyer, “Apollodorus von Damaskus – der Architekt des Pantheon,” *Jahrbuch des Deutschen Archäologischen Instituts* 90, 1975, pp. 316–347. Heinz-Otto Lamprecht, *Opus Caementitium. Bautechnik der Römer*, Düsseldorf 1985, p. 175; Martines 1989; Wilson Jones 2000, pp. 192–193; Alessandro Viscogliosi, “Il Pantheon e Apollodoro di Damasco,” *Tra Damasco e Roma: L'architettura di Apollodoro nella cultura classica,* ed. Festa Farina et al., Rome 2001, pp. 156–161.

66 MacDonald 1965, 2nd ed. rev. 1982, pp. 108–109.

67 J. Durm, *Die Baukunst der Etrusker. Die Baukunst der Römer*, Stuttgart 1905; Bianchi 2000; Lancaster 2005, pp. 86–112.

68 F. Lepper and S. Frere, *Trajan's Column, a New Edition of the Cichorius Plates*, Gloucester 1988; S. Settis, A. La Regina, G. Agosti, and V. Farinella, *La Colonna Traiana*, Turin 1988; S. Maffei, s.v. “Forum Traiani: Columna,” in Steinby 1995–1999, vol. 2, Rome 1996, pp. 356–359; Martines 2000b, pp. 19–88; Martines, ed., *Colonna Traiana. Corpus dei disegni 1981–2001*, Rome

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69 Dio Cassius, 68.13; G. G. Tocilescu, *Fouilles et recherches archéologiques en Roumanie,* Bucarest 1900, pp. 140–141; D. Scagliarini Corlàita, "Per un catalogo delle opere di Apollodoro di Damasco, architetto di Traiani," *Ocnus – Quaderni della Scuola di Specializzazione in Archeologia* 1, 1993, pp. 185–193; A. S. Stefan, *Le guerres daciques de Domitien et de Trajan. Architecture militare, topographie, images et histoire,* Rome 2005, pp. 641–642. See also Chapter Seven in this volume.

70 Martines 2000b.

71 Apollodoros, "Poliorketica," 143.6–145.6, in *Griechische Poliorketiker*, ed. Rudolf Schneider, Berlin 1908, pp. 14–15; G. Commare, "La Poliorcetica di Apollodoro: traduzione," *L'arte dell'assedio di Apollodoro di Damasco,* ed. Adriano La Regina, Rome 1999, pp. 51–77; Martines 2001, pp. 20–30.

72 The height of Trajan's Column from the bottom to the top of the original marble structure is 38.57 meters; see Martines 2000b, p. 75, Plate 1. The ancient statue of the emperor is missing: cf. Martines 2000b, pp. 64–68; Wilson Jones 2000, Chap. 8.

73 In 1929–1934, Alberto Terenzio directed an important restoration of the entire monument, with direct observation of the extrados under the lead roof, which revealed the layer of *opus signinum* for waterproofing. In ancient times, the dome was further lined with bronze and perhaps gilded tiles, but these were removed by Costans II in 663 and then taken by Saracens; see P. Tomei, "Le vicende del rivestimento della cupola del Pantheon," *Bollettino d'arte* 32, 1938, pp. 31–39; Licht, 1968, p. 136. All that remains of the bronze are the plates forming the ring round the oculus, which are certainly from Hadrian's time. Furthemore, the dome's lowest step-ring still has 34 marble tiles in situ, see Lucos Cozza, "Le tegole di marmo del Pantheon," *Città e architettura nella Roma imperiale: atti del seminario del 27 ottobre 1981 nel 25° anniversario del Accademia di Danimarca*, Odense 1983, pp. 109–118.

74 C. L. Frommel and N. Adams, eds., *The Architectural Drawings of Antonio da Sangallo the Younger and his Circle*, vol. 2, New York 2000, pp. 90–91.

75 Luca Beltrami, *Il Pantheon: La struttura organica della cupola e del sottostante tamburo, le fondazioni della rotonda, dell' avancorpo, e del portico, avanzi degli edifici anteriori alle costruzioni adrianee. Relazione delle indagini eseguite dal R. Ministero della Pubblica Istruzione negli anni 1892–93, coi rilievi e disegni dell' architetto Pier Olinto Armanini*, Milan 1898, p. 17.

76 Beltrami 1898, p. 17. See also P. Ciancio Rossetto, G. Pisani Sartorio, F. C. Uginet, eds.,*Roma Antiqua, "Envois" degli architetti francesi (1786–1901). Grandi edifici pubblici,* exhib. cat., Rome 1992, pp. 124–130.

77 Beltrami 1929, pp. 23–24.

78 Beltrami 1898, p. 71.

79 De Angelis d'Ossat 1938.

80 Giuliani 1970; Bianchi 2000.

81 For further detail see Giangiacomo Martines, "The Structure of the Dome," in Grasshoff Heinzelmann, and Wäfler 2009, pp. 99–105; Pelletti 1989; Beltrami 1898; Alberto Terenzio, s.v. "Pantheon," *Enciclopedia Italiana* 26, 1949, pp. 212–214; Licht 1968; Martines 1989.

82 According to Pliny the Elder lime was best after maturing for three years (*Naturalis Historia* 36.173). See also C. Conti, G. Martines, and C. Usai, "Gli interventi di conservazione su materiali e superfici," *Trattato di restauro architettonico vol. III*, ed. Giovanni Carbonara, Torino 1996, pp. 199–205.

83 D. Moore, *The Roman Pantheon: The Triumph of Concrete*, Wyoming 1995.

84 Vitruvius, 2.6.1.

85 Guglielmo De Angelis d'Ossat, "Le rocce adoperate nella cupola del Pantheon,"*Atti della Pontificia Accademia della Scienze, Nuovi Lincei* 83, 1930, pp. 211–215. Cf. Lamprecht 1985.

86 Licht 1968, pp. 134–136. See also Terenzio 1949; Lamprecht 1985, p. 176.

87 Moore 1995; Lancaster 2005.

88 Lamprecht 1985, p. 176.

89 De Angelis d'Ossat 1938, p. 227; De Caro and Greco 1981, p. 58.

90 The latter is a very rare example of filling abutments on the extrados with earth. For this observation, I am indebted to Professor Cairoli Fulvio Giuliani, during restoration work on the "Tempio della Tosse" in Tivoli, carried out in the summer of 2001 by the engineer Fabio Taccini under the direction of the architect Stefano Gizzi.

91 Giuseppe Cozzo, *Ingegneria Romana: maestranze romane; strutture preromane, le costruzioni dell' anfiteatro flavio, del Pantheon, dell'emissario del Fucino*, Rome 1928; see also Lancaster 1998, pp. 147–174; Lancaster 2005.

92 G. Giovannoni, *La tecnica della costruzione presso i Romani*, Rome 1925, p. 42.

93 Rowland Mainstone, "Le origini della concezione strutturale della cupola di Santa Maria del Fiore," *Filippo Brunelleschi. La sua opera e il suo tempo. Atti del Convegno Internazionale per il sesto centenario della nascita, 16–22 Ottobre 1977*, Florence 1980, pp. 883–892.

94 G. Rohlfs, *Primitive Kuppelbauten in Europa*, Munich 1957; G. Simoncini, *Architettura contadina di Puglia*, Genoa 1960; E. Allen, *Stone Shelters*, Cambridge, Mass. 1971; P. Oliver, ed., *Encyclopedia of Vernacular Architecture of the World*, Cambridge 1997; L. Lago, *Pietre e paesaggi dell'Istria centro-meridionale. Le "casite,"* Trieste 1994.

95 J. Fleming, H. Honour, and N. Pevsner, *The Penguin Dictionary of Architecture and Landscape Architecture*, London 1999, p. 47.

96 Oliver 1997.

97 Massimo Pallottino, *La Sardegna nuragica*, Rome 1950; see also G. Lilliu, *La civiltà nuragica*, Sassari 1982; Franco Laner, *Accabadora. Tecnologia delle costruzioni nuragiche*, Milan 1999.

98 Aristotle, "De Mirabilibus Auscultationibus," *Minor Works*, fourth century BC, trans. W. S. Hett, Cambridge 1955, p. 281.

99 For the "Tomba dei Carri," see S. Di Pasquale, *L'arte del costruire*, Venice 1996, pp. 229–237.

100 The third-story drum-barrel vaults are embedded in the dome for up to 8.4 meters from the springing of the dome, halfway up the second row of coffers. At the end of the barrel vaults, the intrados project 1.8 meters from the springing.

101 Eugène-Emmanuel Viollet-le-Duc, s.v. “Voute,” *Dictionnaire raisonné de l’architecture française du XI° au XVI° siècle*, Paris 1875, vol. 9, pp. 471–474.

102 Adam 1984. Rakob 1988, pp. 280–281, disputes Adam’s proposal for the Temple of Mercury at Baiae; see also Taylor 2003, pp. 190–211, and Lancaster 2005, pp. 44–45.

103 Licht 1968, p. 141.

104 De Angelis d’Ossat 1938; Lamprecht 1985, pp. 174–177; Lancaster 2005.

105 G. Heene, *Baustelle Pantheon: Plannung, Konstruktion, Logistik*, Düsseldorf 2004, p. 57. In Heene’s view, pp. 28–32, four rings of coffers were built by corbeling whereas, in my opinion, just three were built so. According to Mark 1987, p. 146, the coffering lightens the structure by less than 5% of the total mass of the dome.

106 C. Lévi-Strauss, *La pensée sauvage*, Paris 1962, pp. 25–27.

107 E. Comba, *Introduzione a Lévi-Strauss*, Bari 2000, pp. 82–85.

108 Lévi-Strauss 1962, p. 25.

109 Wilson Jones 2000.

Five Sources and Parallels for the Design and Construction of the Pantheon

Gene Waddell

The Pantheon is considered one of the most characteristic examples of Roman architecture, but at the time it was created, it was unusual in many respects. Its design involved a novel combination of elements from a half-dozen different building types: baths, tombs, basilicas, temples, triumphal arches, and theaters. The unprecedented span required a new approach to concrete construction. Only by virtue of its success did the Pantheon become emblematic of Roman imperial monumental architecture.

Previous studies have done much to identify likely sources for the Pantheon, but so far they have focused on individual features and placed more emphasis on design than on construction. This study explores both aspects, while special emphasis is placed on clusters of features common to the Pantheon and earlier structures. When a cluster of features occurs in a recently constructed, major monument in Rome or its environs, it can be considered a likely source. Of course, other possible sources may well not have survived, and it is also instructive to examine parallels in buildings that, while they may not have influenced the Pantheon overtly, enhance our understanding of contemporary practice.

Initially, this chapter reviews the principal buildings that have previously been identified as sources. Detailed consideration is then given to significant clusters of individual elements in these and other buildings that are either earlier or roughly contemporary with the Pantheon. A conclusion summarizes the relative importance of the influences that were combined inventively so as to create a new and influential archetype.

The Four Main Design Elements

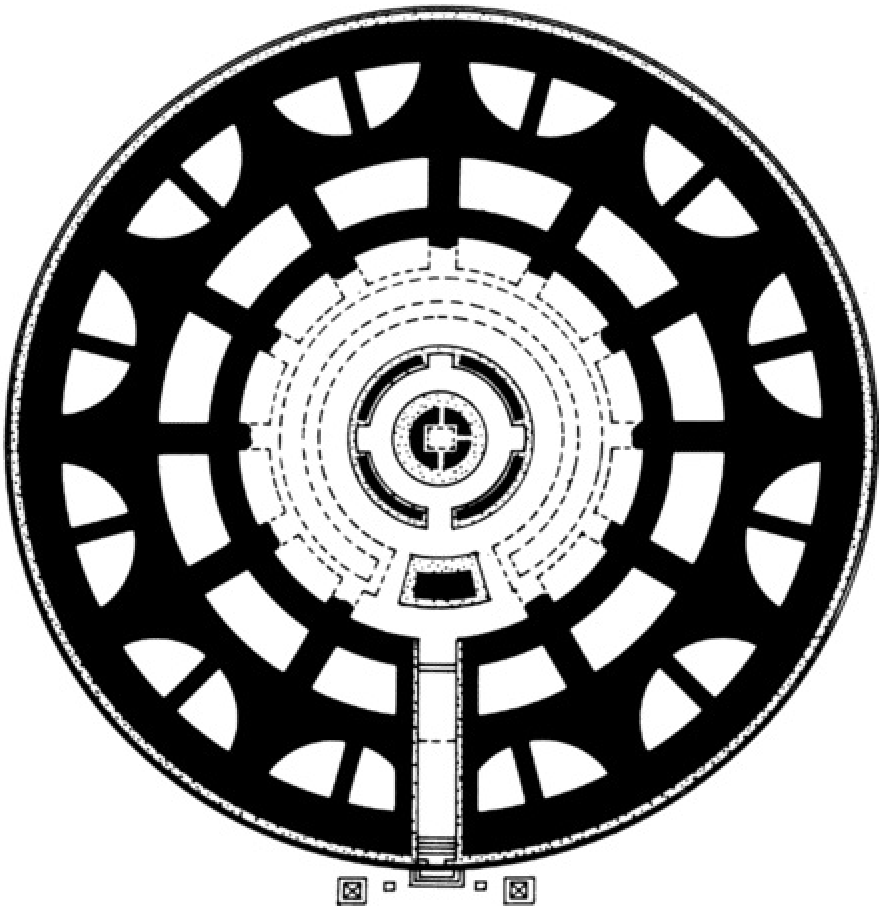
A portico, transitional block, drum, and dome are the four main design elements making up the Pantheon. Earlier buildings provide numerous examples of each of these features, but no earlier building is known to have combined all four of them. Porticoes were initially used in Roman architecture primarily for temples, of which they were an integral part under a common roof. The Pantheon's portico was unusual in that it was attached to the front with a separate roof.

A transitional block facilitated the attachment of a rectangular portico to a cylindrical drum; this slab-like block of masonry may be likened to the walls to which Roman architects had previously attached some temples. The Temple of Mars Ultor, for example, butts up to the firewall that separates the Forum of Augustus from an adjacent neighborhood. The transitional block of the Pantheon also provided space for stairs, as had been done previously in the back of the semicircular exedras of Trajan's Baths (discussed in Chapter Seven).

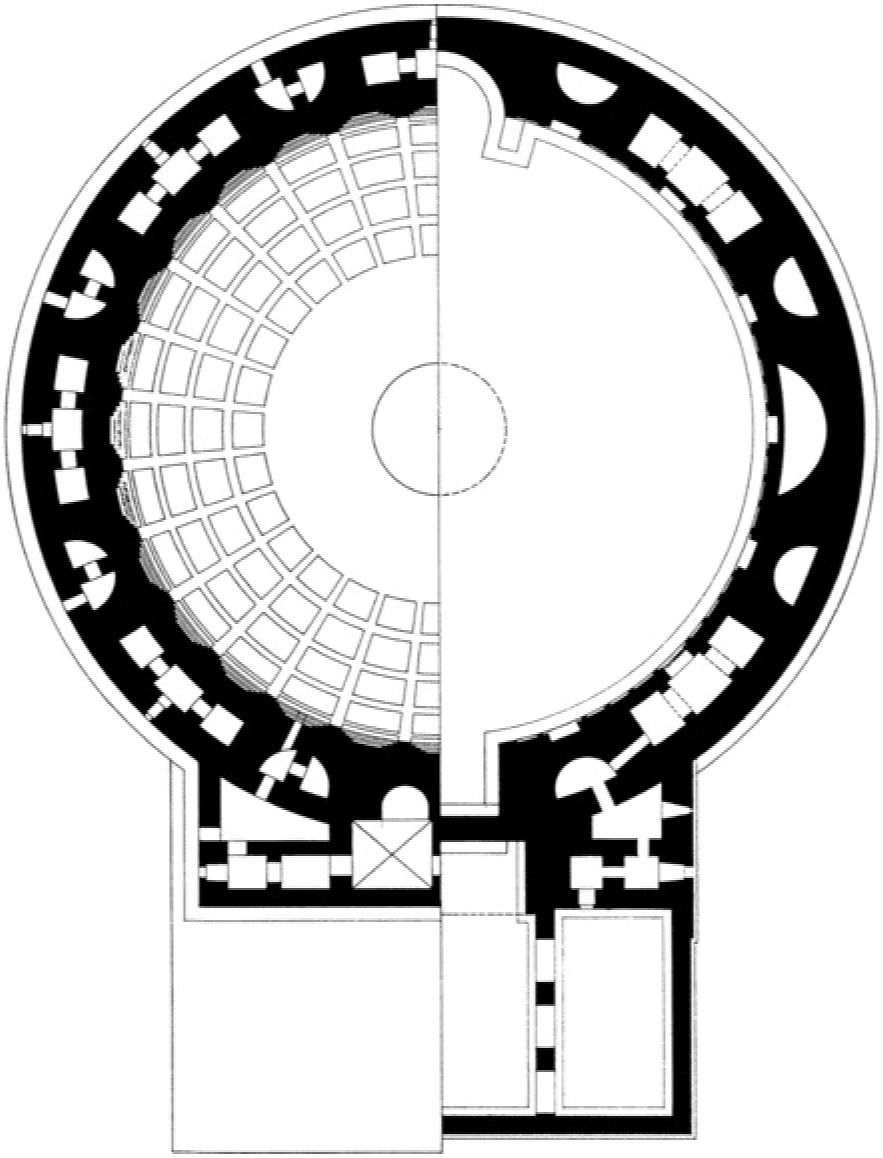
Prior to the construction of the Pantheon, the largest freestanding cylindrical structures were tombs such as the Mausoleum of Augustus (Fig. 5.1a and b). Their walls were windowless, like the

Pantheon's drum. A thick circular drum also provided the most even support for a dome, while the addition of a portico helped to distinguish this project from a tomb.

(a)



(b)



5.1. Plan of the Mausoleum of Augustus (a) and plan of the Pantheon (b) at both pavement level and at the springing of the dome, not to same scale. (Wilson Jones 2000, Figs. 4.6, 9.14)

The largest number of design features adapted for the Pantheon were used previously in Imperial Roman baths (*thermae*), the building type that had most fully demonstrated the potential of concrete on a large scale. A dome with an oculus had been used in baths for more than a century, but only as part of a larger complex, and not as freestanding structures.[1]

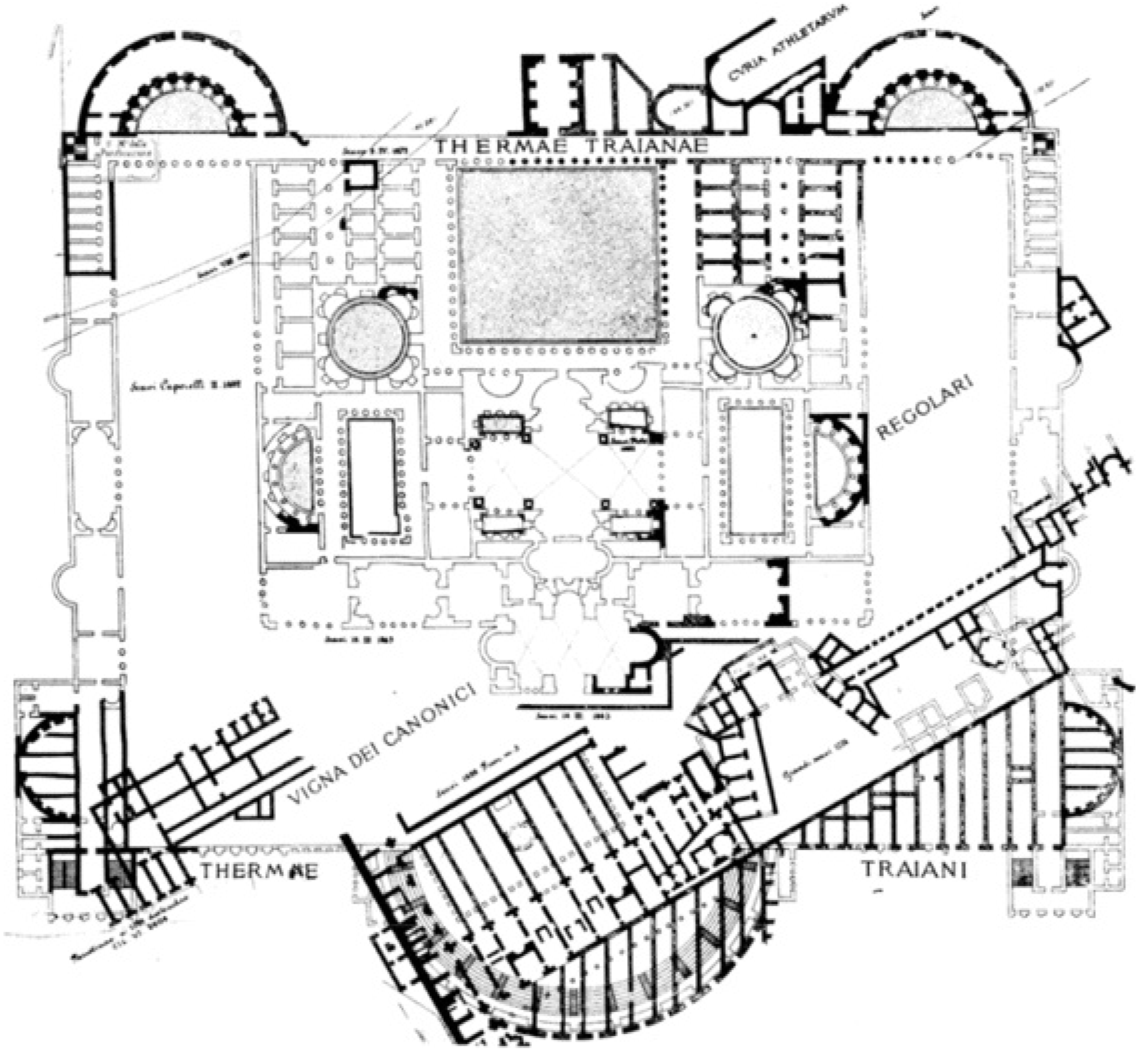
Major Buildings of Influence

Kjeld De Fine Licht and William L. MacDonald considered the possible sources of design for the Pantheon, and both of them identified sources of influence in major imperial buildings of the preceding decades. Agrippa's Pantheon was nottaken into account as a probable source by these authors because at the time they wrote, it was thought to have a completely different shape (see Fig. 1.3). Today, by contrast, there is no question that the name "Pantheon" was adopted from this predecessor, and that its foundations were reused for the present portico and transitional block. It is further possible that a large circular space anticipated the present rotunda, within which a marble

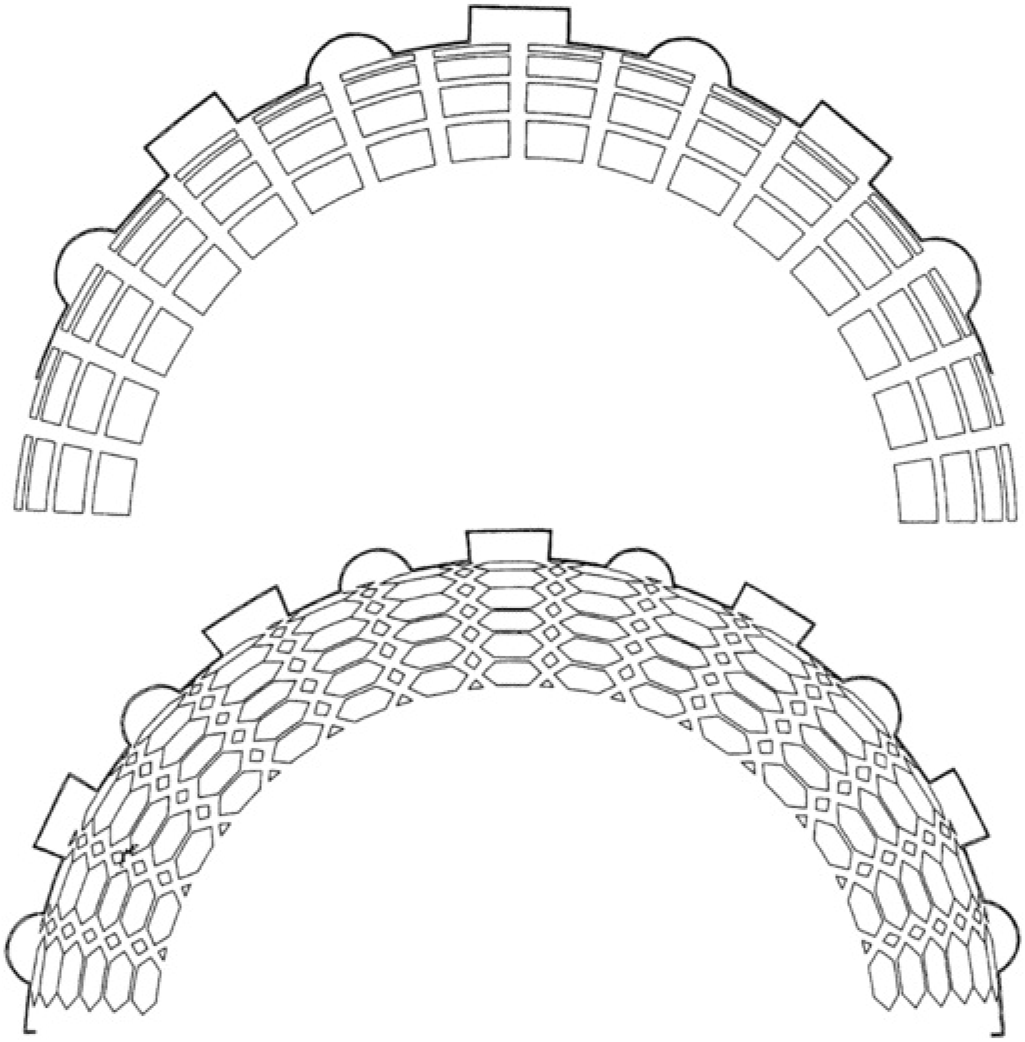
floor has been found beneath the existing one, though it is unclear if it was roofed over, and certainly not with a concrete dome.[2] The purpose of Agrippa's Pantheon and the question of its influence on its successor are explored in Chapter Two.[3] The prospect that there was deliberate continuity between the projects is an intriguing one, yet it cannot detain us long here since the focus of this contribution is on specific physical evidence and on the details of articulation and construction.

Licht pointed out similarities with the actual Pantheon in the materials, scale, and details in the exedras of Trajan's Baths, and he emphasized the importance of bath buildings generally, including several examples at Baiae. MacDonald pointed out numerous similarities with Trajan's Markets. Both scholars considered the Domus Aurea a turning point in the handling of space and light. Both considered the development of individual design features, but neither considered clusters of related elements or methods of construction in detail.[4] They noted important similarities, but differences also need to be taken into account in order to determine which sources were most likely to have had the most direct influence on the Pantheon.

Trajan's Baths were constructed just northeast of the Colosseum from AD 104–109 over the top of the Domus Aurea; this immense complex set the standard for the imperial baths that were later constructed by Caracalla and Diocletian. The main space was the grandiose *frigidarium* with its triple cross-vaults and a span of about 85 Roman feet, while the complex also included several domes and half domes. Two domed halls were approximately 75 Roman feet in diameter (or half that of the Pantheon), but these differ in that they were inserted into square envelopes that were integral to the main building (Fig. 5.2). There also survive three exedras open to the air with half domes that are about 100 Roman feet across or nearly two-thirds as wide as the Pantheon with equivalent coffer patterns (Fig. 5.3).[5]

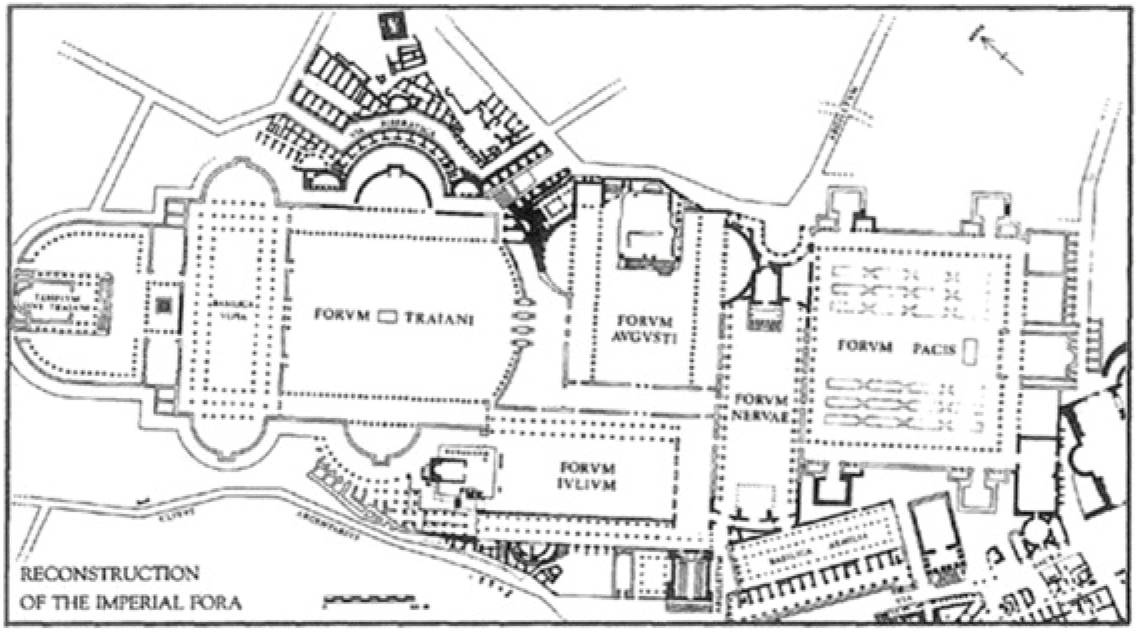


5.2. Plan of Trajan's Baths. (Diagram Italo Gismondi, in Nash 1962, Fig. 1283)



5.3. Pair of exedras in Trajan's Baths; the coffering only aligns with the niches on the main and diagonal axes. (Wilson Jones 2000, Fig. 9.22)

Trajan's Forum, dedicated in AD 112, was the culmination of the sequence of imperial fora. Trajan's was the largest that had been constructed in Rome, and it included a public square, a basilica, two libraries, and Trajan's Column (Fig. 5.4). The interior of the Basilica Ulpia had a span of 85 Roman feet, similar to that of the frigidarium of Trajan's Baths, but in this case only the pair of side aisles were vaulted. As in earlier basilicas, the central space had a roof with wooden trusses resting on two stories of columns, and the upper level had a clerestory. The Pantheon's dome spanned nearly twice this distance with masonry rather than wood, yet there is a dimensional similarity with the large exedras at each end of the nave that were approximately 150 Roman feet in diameter. Like the nave, these exedras were covered with a wooden roof. Depictions on coins indicate that the main entrance had a portico with a *quadriga*.[6]



5.4. Imperial Fora, Rome, including Trajan's Forum and Trajan's Markets. (Courtesy of James Packer)

Trajan's Markets were built adjacent to the Forum about the same time (Fig. 5.5). The six-storied complex includes at least 170 barrel-vaulted rooms that were probably rented as shops or used as imperial offices, but its precise function is uncertain. The complex was built against the southwest end of the Quirinal, which was cut back to create Trajan's Forum. The largest space, the Market Hall has six cross-vaults. With its span of nearly 30 Roman feet and length of roughly 110 feet, and being well lighted by a clerestory, it is one of the most impressive surviving examples of Roman vaulting. The Markets were constructed almost wholly of brick-faced concrete with masonry vaulting throughout.[7] Concrete was used in highly innovative ways, and some of the methods that were either introduced here or in other Trajanic buildings found application in the Pantheon.

5.5. Trajan's Markets. (Waddell 2008)

The Domus Aurea, or Golden House, of Nero was designed by Severus and Celer and built fron AD 64 to 68. It covered a vast area from the Oppian Hill to the Palatine that was later built over by

structures that included, in addition to Trajan's Baths, the Colosseum, Titus's Baths, and the Temple of Venus and Rome. Part of the complex that survives beneath the platform constructed for Trajan's Baths includes an octagonal domed room built of concrete. This room greatly impressed Nero's contemporaries, and it is widely believed to represent a turning point in Roman architecture. For MacDonald, it "represents the first culminating stage in the creation of centralized interior architecture" (with the Pantheon as the second stage), and he noted that in its interior "shape, space, structure, and light are interlocked as one."[8] In this volume, Giangiacomo Martines has provided additional support for this building as a probable source for the design of the Pantheon. Its main space is the earliest surviving polygonal room that demonstrated the potential of concrete to create an unusual and dramatically lighted space (see Fig. 4.8). Soon afterwards, Domitian's Palace was constructed with unusual vaulted spaces, but they are also less likely to have influenced the Pantheon than the larger and more recently constructed public buildings of Trajan's reign.

Beyond the vicinity of Rome, Baiae has the largest concentration of major domes. Four domes have been called temples, although most if not all of them were parts of baths. They differ from the Pantheon in being constructed as relatively thin shells, and they lack coffering. Only one is unquestionably earlier.[9] This, the Temple of Mercury, was probably built a century or more before the Pantheon, and it displays a quite different method of construction. It has a span of 21.55 meters or about 73 Roman feet, and even though it is partly filled with silt and water, it provides a good impression of how domes of equivalent size in Trajan's Baths must have looked. The largest of the three domes at Baiae is the octagonal Temple of Diana, which, at 29.5 meters in diameter, is nearly two-thirds as wide as the Pantheon, but this dome is relatively pointed in profile. It has generally been dated to the second century AD or to the early third century. The octagonal Temple of Venus, which had a span of 26.3 meters, probably dates later in the second century AD than the Pantheon. Although its walls are substantially intact, little of its dome survives. Unlike the Pantheon, both the Temple of Diana and the Temple of Venus have windows in their walls.[10]

Licht and MacDonald noted a number of buildings at Hadrian's Villa that are more likely to be parallels than influences depending on when they and the Pantheon were constructed (see Chapter Three in this volume). The villa was constructed near Tivoli and almost entirely during the reign of Hadrian, from AD 117 to 138. Over an extensive site, about 2 kilometers long and from 0.5 to 1.0 kilometers wide, dozens of major buildings have survived, singly or mostly arranged in scattered groups. All were constructed of concrete, but unlike the brick-faced concrete of the Pantheon, here it was typically faced with wide bands of *opus reticulatum* (blocks of *tufa* arranged in a diagonal net-like pattern) alternating with narrow bands of brick. Many structures at the villa have domes or half domes, and some domes are hemispherical and have an oculus. Other domes and half domes have vertical segments that resemble a pumpkin or gourd, shapes that are noteworthy for the sophistication of their conception and the difficulty of their execution. The "Maritime Theater" is an island villa or retreat within a cylindrical drum that has nearly the same diameter as the Pantheon's interior (Fig. 5.6).[11]


5.6. So-called Maritime Theater, Hadrian's Villa, Tivoli. (Photo author in 1982)

MacDonald mentioned the probable influence of cylindrical tombs, including that of Caecilia Metella. He also discussed the possible influence of the Greek *tholos*, the other main type of freestanding circular building that had been previously constructed in Rome. Examples include the Round Temple by the Tiber, the so-called Temple of Sibyl at Tivoli, and the tholos in the Largo Argentina. All three of these examples had a peristyle around a small cella with an internal diameter of about 25 Roman feet.[12] Vitruvius (4.8.3) refers to domes on circular peripteral temples, but these examples are more likely to have had a wooden roof like all known Greek examples. At most, therefore, they are only indirect sources for the Pantheon.

Parallels for Design and Sources for Structural Elements

The most significant *design elements* present in the Pantheon are as follows: (A) a freestanding building with an attached and pedimented portico, (B) a transitional block with stairs, (C) a cylindrical drum without windows, (D) a dome with coffers and an oculus. There are also a number of (E) other design features that had been used in Roman architecture: cross axes for a circular plan, immense monolithic shafts of granite, an internal clerestory, the use of bilateral symmetry, an orthogonal floor pattern for a circular plan, and a different elevational treatment of the attic compared with the main interior order. All parts of the design were interrelated using (F) simple proportions characteristic of Roman architecture. The most significant *structural elements* are (G) a dome with its base constructed of rings of concrete (step-rings) separated by layers of brick, (H) a cellular wall on multiple levels, (I) concrete with horizontal layers of aggregate, (J) "relieving arches" of brick-faced concrete, and (K) concrete vaults with brick laid flat against their intrados.

(A) Freestanding Building with an Attached and Pedimented

Portico.

As already noted, a portico was usually an integral part of the overall form of temples, under the same gabled roof. Attached porticoes were less common, and they might or might not have had a pediment. Round temples ordinarily had encircling peristyles rather than projecting porticoes. In having an attached portico with a pediment, the Pantheon resembles some earlier transverse temples such as the Temple of Concord, which had a rectangular cella with a portico on one of its longer sides. During the Roman Republic, pedimented porticoes were ordinarily reserved for sacred structures, but their use became more widespread over time.[13] Basilicas generally had porticoes without pediments.[14] As mentioned, the Basilica Ulpia (Fig. 5.4) had an unpedimented portico in the center of a longer side, and the Basilica Nova was redesigned to have an unpedimented portico on a long side as well as at one end.[15]

A number of later rotundas with porticoes show the direct influence of the Pantheon. The Tor de' Schiavi was an imperial tomb with a pedimented portico, and the "Pantheon" at Ostia was a rotunda with an unpedimented portico. However, no domed building earlier than the Pantheon is definitely known to have had an attached portico.[16]

(B) Transitional Block with Stairs.

The front of the transitional block of the Pantheon, despite the columns of the portico that screen it, resembles a triumphal arch, while in its plan and function it is equivalent to the stair towers built behind some of the exedras of Trajan's Baths (Fig. 5.2). The main functional purpose of the transitional block is as a container for stairs, which had been included in some Greek temples and which were used more widely in such Roman buildings as baths, triumphal arches, and triumphal columns. As Mark Wilson Jones notes in this volume, the nearest parallels for trapezoidal stairs fitted into a block that mediates between an orthogonal envelope and a circle are those associated with the exedras at Trajan's Baths.

(C) Cylindrical Drum without Windows.

Windowless walls of concrete faced with brick were fireproof, and they have proven to be one of the most permanent types of construction ever used. In form and scale, the windowless exterior of the freestanding Pantheon most closely resembles the earlier Tomb of Caecilia Metella and the later Tomb of Hadrian (Castel Sant'Angelo), both of which were constructed primarily of concrete, but with stone rather than brick exterior facings. The former has a small corbeled dome with an oculus in the center, and the latter has a small dome in its central tower. Both of these cylinders have square bases. The Pantheon's walls were hollowed out and given a cellular wall structure similar in plan to the outer ring of the Mausoleum of Augustus (Fig. 5.1). Adoption of the circular form of tombs facilitated support of the largest dome that had ever been created, but there needed to be a way to distinguish the Pantheon from a tomb, and as has been noted, this was accomplished primarily through the addition of a portico.

The Pantheon's exterior has three cornices that reflect three levels of small chambers within its walls, rather in the way that cornices align with vaulted spaces on the facades of Roman theaters. This building type is unlike the Pantheon in having open arches for circulation, yet there is an affinity

inasmuch as theaters were usually freestanding and constructed primarily of concrete, and they were among the few types of Greek or Roman buildings that made use of circular geometry.

(D) Dome with Coffers and an Oculus.

The Pantheon's dome is by far its most impressive element both visually and structurally, and although there are close precedents for its design, there are also significant differences. In addition to having the same 1:1 ratio between width and height, the exedra on the east side of Trajan's Baths have coffers that are closest in design of any known precedent to those of the Pantheon (Fig. 5.7).[17] Each coffer consists of three successively smaller and more deeply recessed squares that closely resemble the uppermost row of coffers in the Pantheon; the other four rows have coffers with four successively smaller squares. In both buildings, the squares are inflected upward, which enables every square to be visible from the center of the interior.[18]

5.7. East exedra of Trajan's Baths. (Photo author in 2007)

Parts of the west dome of Trajan's Baths have survived, and its east dome is depicted on a surviving fragment of the Marble Plan of Rome, but it is not known if these domes had coffers. In the eighteenth century, Charles Cameron was able to determine that these domes were very close to half

the Pantheon's diameter.[19] The Marble Plan depicts a circular room within windowless square walls, suggesting that it was illuminated by an oculus. It had large niches corresponding to the four corners.[20] The arrangement of niches was similar to that of the semicircular exedras in the Pantheon, except that these occur on the cross axes rather than the diagonal axes.[21]

(E) Other Design Features.

Many Roman buildings orchestrate space by means of axes subordinate to the main one, and the Pantheon is a particularly rich example of this principle. The main axis of the interior is made immediately apparent by the arched entrance and apse. The cross axis is emphasized by exedras that align with the square pattern of the floor and coffers.[22] A closely similar floor pattern had been used for the apsidal ends of the Basilica Ulpia. Indeed, the patterns of both the floor and walls consisted of basic geometric forms; this design feature and the restraint with which the forms were used are characteristic of Trajanic architecture in Rome. The lavish use of color and of exotic materials characterized imperial architecture generally, but color was usually subordinated to form.

Monolithic shafts of granite were more difficult to quarry and transport than drums of marble, but a granite shaft in one piece was considered worth the extra effort and expense. Granite was one of many types of exotic colored stones that were imported from newly acquired provinces to embellish Rome in the imperial period. Large granite monoliths had been used as early as Vespasian's Forum of Peace, which was dedicated in AD 75.[23] They had been used extensively in the Forum of Trajan for the main floor of the interior of the Basilica Ulpia, which had columns with shafts 30 Roman feet tall, or three-quarters as tall as the 40-foot granite shafts of the Pantheon's portico.[24] Here, the shafts are of two different colors (gray and red), and the monolithic shafts of marble fronting the exedras in the interior are also of two colors (although this is not obvious today due to staining). The use of different colors of marble for the same elements was not unusual, and it was done symmetrically. What is unusual is for a portico with columns to have square column-like piers, or *antae*, that are different in material (marble rather than granite), in color (white rather than gray or red), and in construction (drums rather than monoliths).

The attic of the Pantheon's interior resembles the clerestories of basilicas and other buildings, except that its six framed openings or "windows" allow the light passing through the oculus to illuminate the exedras. This arrangement is the reverse of the usual way that a clerestory admits light into a space. Blind windows centered above the adedicules and eight structural piers maintain the pattern and rhythm of the attic. The orders of the main floor and attic story have similar patterns, each with a wider central intercolumniation.[25] Although these orders differ in scale and alignment, their stylistic affinity, the similar intercolumniations, and the same materials ensure compositional unity.

The architect Apollodorus had recently used clerestories for the Basilica Ulpia and for Trajan's Baths. The hemicycle of Trajan's Markets has alternating triangular and segmental pediments, which prefigure those over the aedicules of the Pantheon. The windows of the Markets are located on an upper floor that resembles a clerestory, and they admit light to the spaces behind them. The pilasters supporting these pediments rest on a running pedestal in an arrangement that is similar to the attic of the Pantheon. As with Roman theaters generally, the uppermost level of the Colosseum exterior has a similar running pedestal, with windows and pilasters rather than an arcade, and its pedestal serves as a facing for barrel vaults in a way that is equivalent to the attic of the Pantheon's interior.[26]

The main story of the Pantheon's interior has exedras fronted by two columns with flanking pilasters, much like the *in antis* (between the walls) arrangement that had often been used in Greek architecture. The wider intercolumniation in the center was characteristic of Greek Ionic and of Roman architecture generally, and it was used in both the portico and the interior of the Pantheon. Indeed, the A-B-A *compositional principle* was in fact used throughout the project. Other examples include the way that the portico is flanked by the drum and the way that niches within the portico flank the wider arch of the entrance, a proportional arrangement that closely resembles the openings of a triumphal arch with a similar A-B-A rhythm as on the interior. (A triumphal arch was located opposite the entrance of the Pantheon in the large open space in front.)

The orthogonal *floor pattern* of the Pantheon most closely resembles the pattern of the Basilica Ulpia, which had circles and squares alternately within a grid of squares. In addition, the way in which this rectilinear pattern was cut through abruptly on the perimeter of its semicircular exedras compares directly with the edge condition of the Pantheon's floor. In turn, the floor pattern of the Basilica Ulpia is similar to that of the adjacent Forum of Augustus, which has squares of similar size separated by broad bands of marble.

The pattern of pilasters on the *attic story* of the Pantheon's interior was cut off above the apse and entrance. Since the floor pattern is cut through around its perimeter, cutting through the pilasters can be considered a solution rather than a solecism, as was presumed by Renaissance critics. Despite the relative independence of the patterns of its orders, the interior was given unity through axial coordination and the use of the same materials and colors for the walls and floor, as well as through the use of similar shapes for the walls, floor, and dome.

(F) Simple Proportions.

As Martines discusses in Chapter Four, the proportions of the Pantheon are straightforward and characteristic of Roman architecture generally. All three surviving exedras of Trajan's Baths have overall heights that are approximately equal to their widths, just as in the Pantheon's interior.[27] The 1:1 proportion seems also to have been used as a basis for the design of the transitional block, which is nearly square like some triumphal arches with triple openings (see Fig. 7.13).[28]

The Basilica Ulpia had semicircular ends or exedras about 150 Roman feet in diameter, or approximately the same diameter as the Pantheon, as the Maritime Theater at Hadrian's Villa, and as the hemicycles of Augustus's Forum.[29] This was also the height of the Mausoleum of Augustus, which was 150 feet in radius. The use of 150 feet as a standard measurement was thus well established before it was used for all three dimensions of the Pantheon's interior.[30] The Pantheon's width on both the main and cross axis as well as its height relate to one another as 1:1:1, and since all three dimensions are so close to 150 Roman feet, the use of this dimension was undoubtedly intended.[31]

Since the Pantheon's exedras are the same width as the piers in between them, they relate to one another as 1:1. Its apse was made somewhat wider and the entrance somewhat narrower for visual and structural reasons, respectively. The ratio of the attic story, or upper part of the interior wall, to the main or lower part is 2:3, another simple proportion that was widely employed.[32]

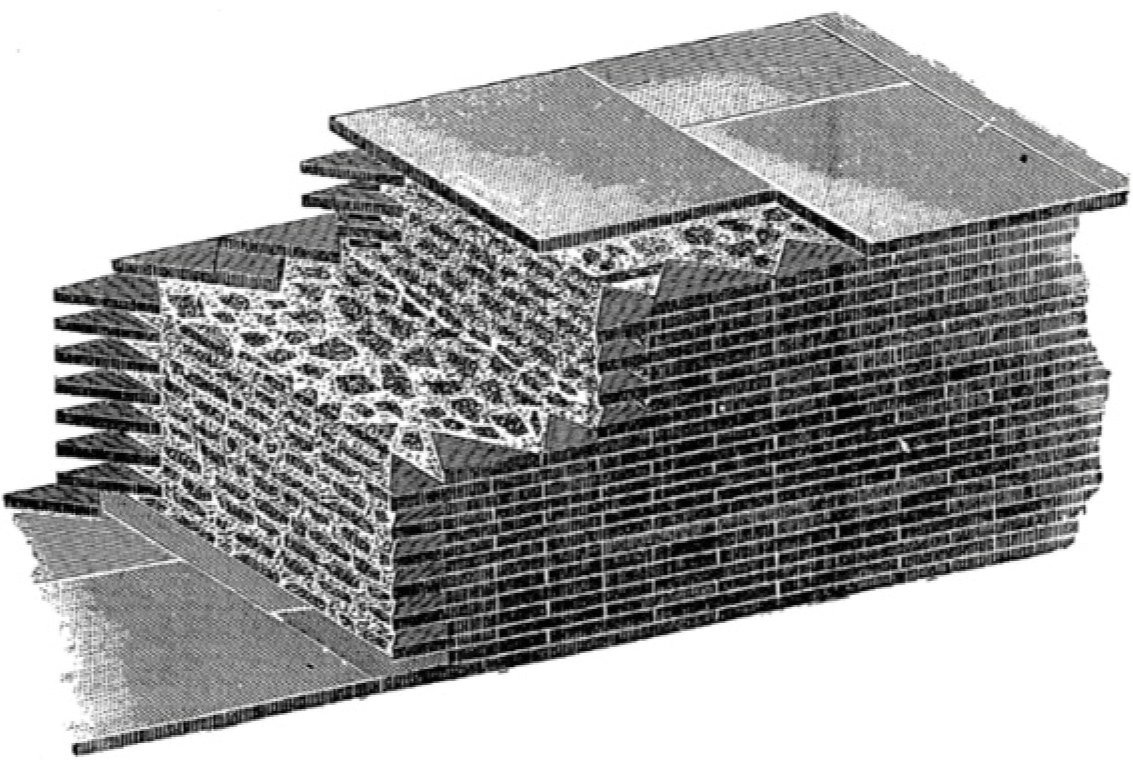
The Corinthian columns of the Pantheon, both exterior and interior, conform to the orthodox pattern of imperial practice that took hold around Augustus's time.[33] In accordance with these principles, the

heights of shafts are multiples of 5 feet (40 feet in the portico, 30 feet in the interior), while the heights of the complete columns (base, shaft, and capital) are 6/5 greater. A ratio was also probably used to determine the thickness of the walls of the rotunda in relation to the distance that needed to be spanned, since proportion represented a convenient way to record what previously had proven to provide adequate structural support. The Pantheon's wall thickness in relation to its span is 1:7.3, somewhere between the extremes of one-eighth to one-fifth encountered in other examples.[34]

In many cases, the same buildings that could have influenced the design of the Pantheon also present similar structural elements. The combination of design and structural elements increases the probability of a direct source.

(G) Dome with Its Base Constructed of Rings of Concrete (Step-Rings) Separated by Layers of Brick.

Through-courses of brick (sometimes called bonding courses) are layers of brick a single brick thick that subdivide sections of concrete at intervals. A through-course of *bipedales* (bricks two feet square) served the purpose of covering the top of each section of concrete and prevented it from drying too fast while it cured (Fig. 5.8). This shows that buildings of the Trajanic and Hadrianic periods were usually constructed one horizontal section at a time. On the exterior and in the staircases of the Pantheon, layers of bipedales are conspicuous at intervals of about 1.2 meters, being thicker as well as wider than the regular facing of bricks that toothed into the concrete and provided a permanent formwork (see Plate XXIII).[35]



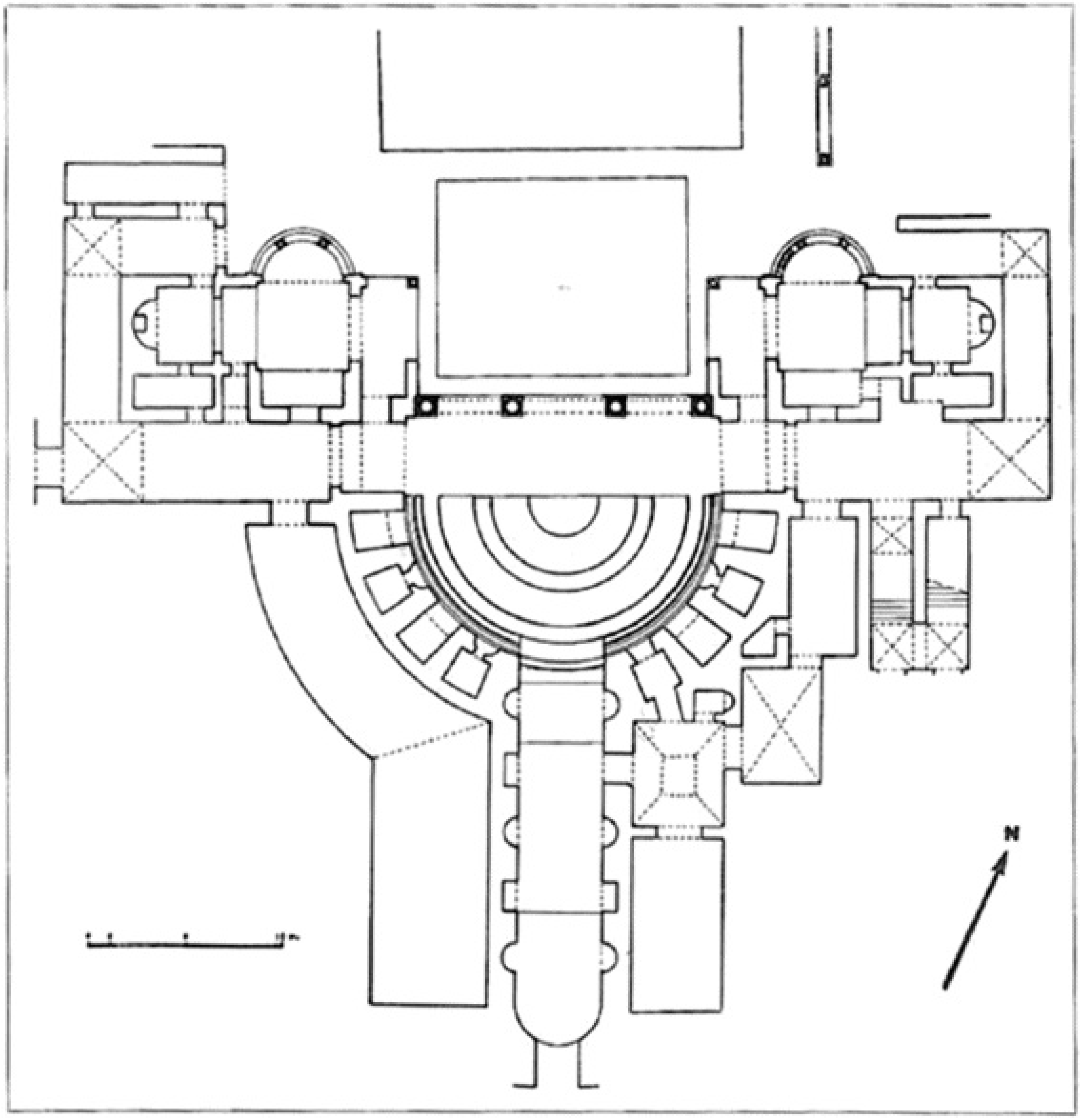
5.8. Typical Roman brick-faced concrete wall with triangular pieces of *bessales* separated by layers of *bipedales.* (Middleton 1892, vol. 1, p. 57, Fig. 8)

A concrete half dome at the north end of the hemicycle of Trajan's Markets resembles the Pantheon's dome, but was constructed differently. As Lancaster pointed out, its relatively thin shell

was constructed first, and a thick layer of *opus signinum* (a highly waterproof hydraulic mortar made with ground potsherds) was applied on top of the upper surface before a surcharge of concrete was added.[36] This surcharge takes a stepped profile, but was not created as an integral part of the dome and does not contain through-courses of bipedales, as is the case with the step-rings of the Pantheon. A thick layer of opus signinum was also used to coat the dome of the Pantheon, but this was added after the step-rings had been created. This exceptionally waterproof layer contributed to the permanence of the building, particularly in the period between the theft of the bronze roof tiles and their replacement by lead roofing.

The Pantheon's dome was constructed one step-ring at a time, and as each step-ring was added, it was cantilevered inward (see Fig. 1.12).[37] Roman domes were usually constructed as monoliths, but up to the top of the step-rings, the Pantheon's dome was constructed in much the same way as its walls. Martines and Wilson Jones note that in part for this reason, the need for centering was minimized. After setting up, the top step-ring provided a firm base on which to cast a saucer dome, and the step-rings contained the thrust of the saucer dome while it cured. This part of the Pantheon's dome is a true dome, and it spans about one-third of the width of the interior (not counting the 30-foot oculus).

Step-rings occur in the Serapeum at Hadrian's Villa, a building similar to the Pantheon in having curving walls with a sequence of piers that radiates like spokes and with a cellular wall on three levels (Fig. 5.9).[38] The Serapeum's step-rings are conspicuous when viewed from the back (Fig. 5.10). Since the building contains bricks that are datable to AD 123, it must be later than the Pantheon, and possibly influenced by it. However, mutual influence cannot be ruled out, nor a lost precedent that influenced both buildings.[39]

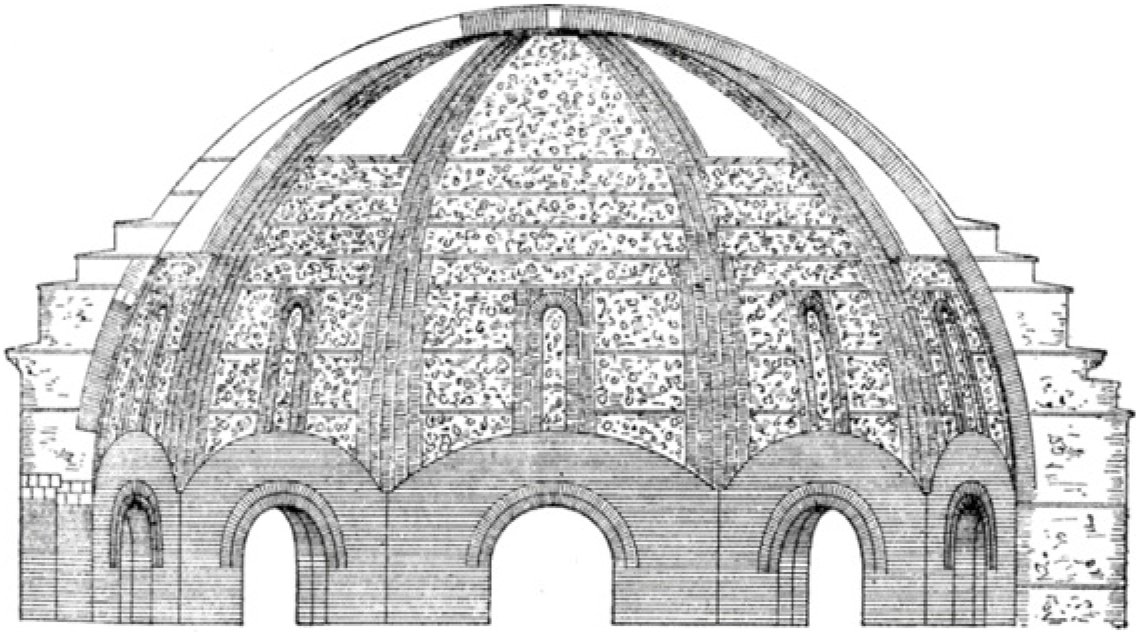


5.9. Plan of Serapeum, Hadrian's Villa, Tivoli. (Aurigemma 1961, Fig. 84)

5.10. View of east side of Serapeum, Hadrian's Villa, Tivoli, showing step-rings, concrete voussoirs, and openings to two of three levels of empty chambers in the walls. (Photo author in 2005)

The Roccabruna at Hadrian's Villa had two domes, one above the other. Its lower dome survives intact, but is less comparable to the Pantheon by being part of a square in plan. The upper part of the Roccabruna, which has been variously reconstructed, had a dome with step-rings, as indicated by large fragments located nearby.

Turning to later examples, the dome of the nymphaeum called the "Temple of Minerva Medica" (Fig. 5.11) is closest to that of the Pantheon in having both step-rings and through-courses that align with one another. Unlike the Pantheon, it has brick ribs or lattices that could easily have misled FrancescoPiranesi into thinking that a similar method was used for the Pantheon.[40] The half dome of the northeast exedra of Diocletian's Baths also has through-courses.



5.11. Section of Temple of Minerva Medica, Rome. (Julien Guadet, *Eléments et théorie de l'architecture cours professé à l'école nationale et special des beaux-arts*, Paris 1915, Fig. 943)

(H) Cellular Wall on Multiple Levels.

Like the Pantheon, the Serapeum has thick walls that include three levels of wall cells disposed radially and with openings to the outside (Figs. 5.9; 5.10).[41] The earlier building most similar in structure was the Mausoleum of Augustus (Fig. 5.1, A).[42] This cellular or diaphragm structure confers the benefit of great rigidity that could resist, in the case of the Mausoleum, the thrust of a mound of earth and, in the case of the Pantheon and the Serapeum, the thrust of their domes. The wall cells of the Serapeum and Pantheon were too small and poorly lighted to be useful for much other than storage, and most were inaccessible. Being open to the outside, they enabled the escape of the heat generated chemically as the concrete cured. The largely hollow walls that resulted are also less likely than solid walls to crack while curing. Like the Serapeum, the Pantheon's three levels of wall cells include an upper set at the level of the base of its dome (Fig. 5.10, and see Plate IV).

(I) Concrete with Horizontal Layers of Graded Aggregate and Through-Courses.

We have already seen that from the Trajanic period, concrete was often laid in layers separated by through-courses of bipedales (Fig. 5.8). As an initially independent development, as early as the Colosseum, heavier aggregates had been used in lower layers of concrete and lighter aggregates in higher layers.[43] At Trajan's Baths, both techniques come together, though not systematically, and here half domes have heavier tufa at lower levels and lighter tufa in the upper part. The Pantheon followed a similar principle, but with more gradations of density in between successive through-courses. Alberto Terenzio established that the heaviest aggregate (travertine) was used for the foundation and the lightest (tufa and pumice) for the saucer dome (see Fig. 1.12).[44]

The damaged front of the Serapeum at Hadrian's Villa provides a good illustration of how the layers of concrete were constructed for most Roman domes. The exposed surfaces of its intrados show that the concrete was built up with fist-sized aggregate set into place individually in horizontal

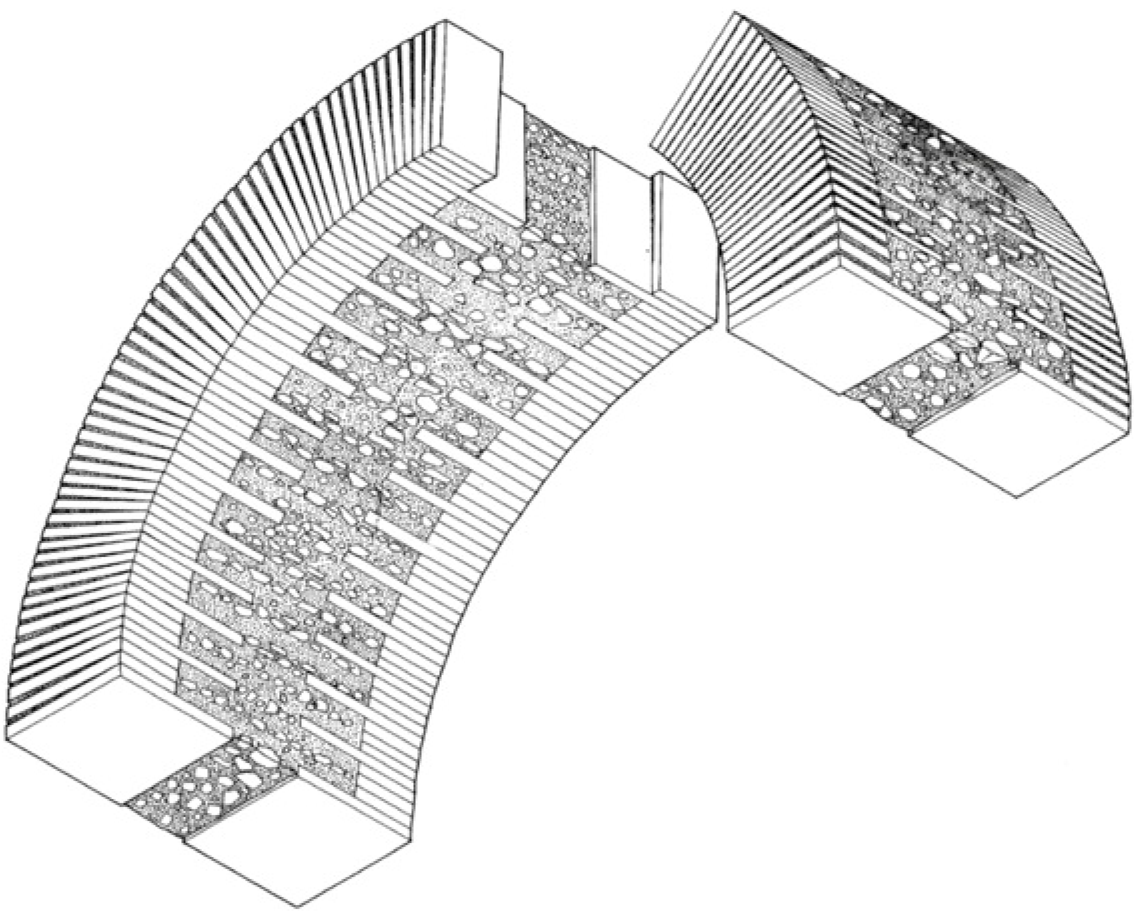
layers. Horizontal layers of aggregate show clearly in photographs of the Pantheon's intrados when stucco was removed in the 1930s.

As mentioned earlier, Hadrian's Villa has numerous other domes and half domes. The vestibule of the Piazza d'Oro has curved walls that support a "pumpkin" dome with single and double curving elements alternating much like the dome of the Serapeum. Its plan resembles the Pantheon's in having alternately rectangular and curved niches, and it, too, had an oculus (as did the dome of the Large Baths at the Villa). This combination of features is more striking than any one feature, and they occur in what is essentially a freestanding building. The method of construction used for the vestibule's dome was similar to the Pantheon's in that a ring of concrete was created first by cantilevering inward to decrease the opening that needed to be spanned. Elsewhere at Hadrian's Villa, cantilevered balconies can be seen on the nearby Barracks of the Vigili and the long building parallel to the pool of the Canopus. Corbeling had been used to similar effect previously, for example in the main hall of Trajan's Markets, but prior to the Pantheon this structural principle is not known to have been used to create a dome or half dome.[45]

(J) "Relieving Arches."

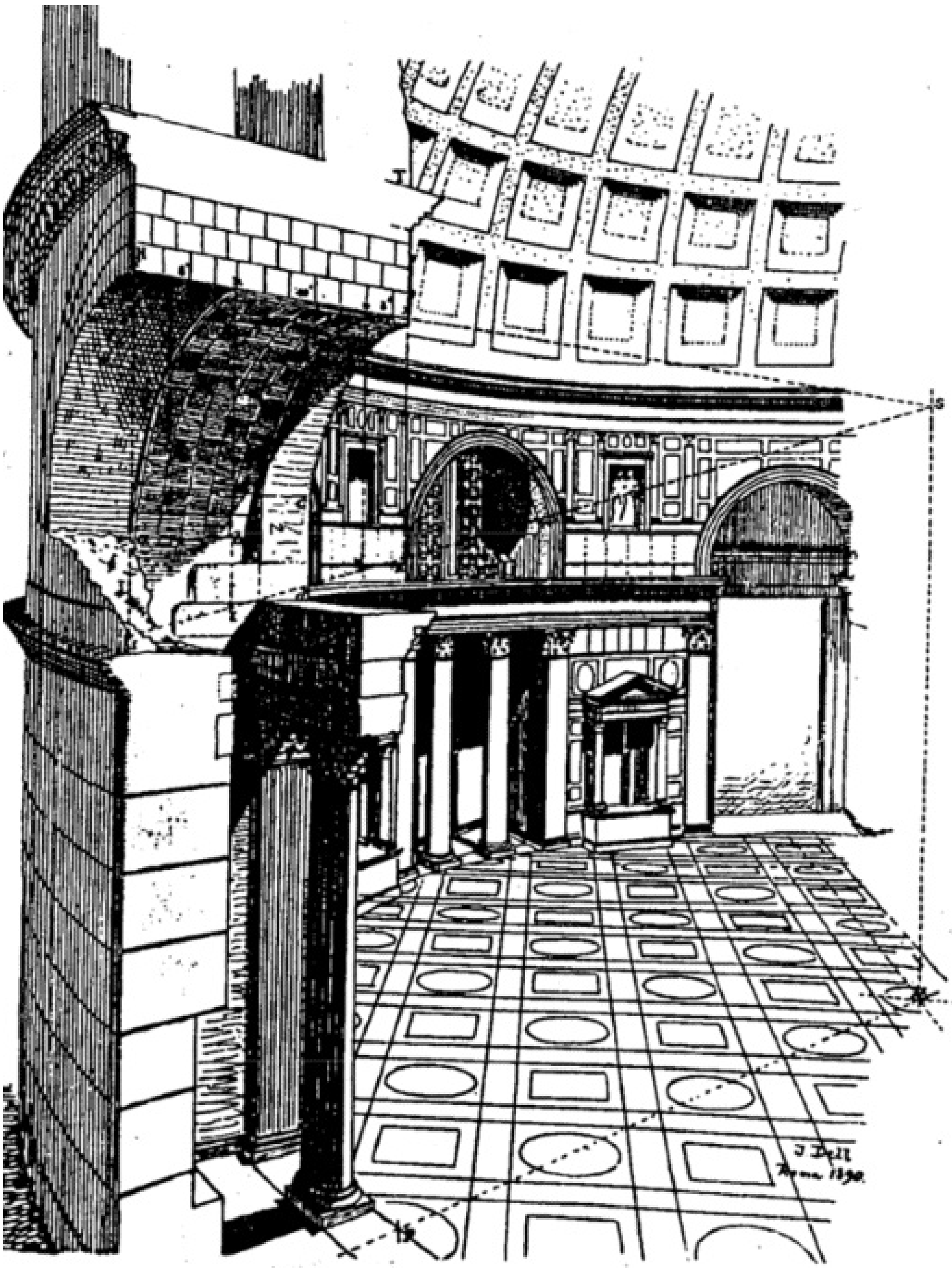
Concrete had largely replaced stone for the construction of arches and vaults before the end of the first century AD. The designation "relieving arches" applies not to open arches but to ones filled with masonry underneath; their purpose was often, it seems, to reduce or relieve pressure over an opening lower down. As Martines also notes, this type of arch was used widely in concrete buildings dating from the reigns of Trajan and Hadrian, including Trajan's Baths, Trajan's Forum, Trajan's Markets, and those at Hadrian's Villa. It is generally assumed that relieving arches were made of brick and mortar rather than concrete;[46] however, examples in the exedras of Trajan's Baths can readily be seen to be made not just of brick but of brick and concrete in combination. Equivalent arches exist in numerous earlier Roman buildings and in the construction of aqueducts; where the internal structure of the arch can be seen, it seems invariably to have been constructed of bricks alternating with portions of concrete shaped like voussoirs.[47] Examples of concrete voussoirs that were used before and after the Pantheon can be seen together in a section of the Arcus Neroniana (Caelemontana) adjacent to the Scala Sancta (Fig. 5.12).[48] Examples constructed during the Hadrianic period include the Serapeum (Fig. 5.10) and the Small Baths at Hadrian's Villa. There concrete voussoirs alternated with portions of brick in the same way that the walls of the Pantheon were no doubt constructed, in line with the typical configuration of relieving arches in this period (Fig. 5.13). When the level of the arch was reached, bipedales were placed radially on top of the centering and were separated from one another by a facing made up of half or quarter bipedales, leaving spaces later to be filled by concrete.

5.12. Detail of brick-faced concrete with concrete voussoirs in the Arcus Neroniana (Caelemontana), built under Nero (AD 54–68) and reinforced during the reign of Septimius Severus (AD 193–211), who inserted a similar arch underneath. (Photo author in 2007)



5.13. Diagram of brick-faced concrete showing the construction of concrete voussoirs. (Courtesy of Nikolaos Karidis)

In conformity with the general perception that relieving arches were made of solid brick, the Pantheon's great arches are usually presumed to have been made of brick and mortar extending entirely through its walls (as in Fig. 5.14).[49] The main evidence for this view is the brick barrel vaulting that projects from the center of the south side of the Pantheon (see Fig. 7.5), but this served a different purpose in acting like the flanking buttresses of the main hall in Trajan's Markets or the buttresses of the Basilica Nova.[50] It may be noted how, as a consequence of its radial plan, all of the relieving arches of the rotunda have to taper; this means that the great arches that show on the exterior become considerably smaller on the interior (see Fig. 7.1). Such tapering or conical vaults had long been used in the substructures of theaters, and they were easily constructed of concrete. To have constructed them of brick alone would have required that some bricks be made wedge shaped both vertically and horizontally and/or that mortar joints be wedge shaped.



5.14. Pantheon, cutaway view. (Josef Dell, "Das Pantheon in Rom," *Zeitschrift für bildenden Kunste*, ns. 4, 1892, p. 273)

Evidence that the great arches of the Pantheon may actually be brick-faced concrete was found in 1882 when a building attached to the back of the rotunda was removed, and a damaged wall surface revealed what was behind its brick facing. A specialist in Roman construction methods, J. Henry Middleton, examined these sections of wall before they were restored, and he stated that "the brick facing, including the arches, only tails into the wall to an average depth of 5 or 6 inches, so that in reality these apparently relieving arches are of little more use (as regards the pressure) than if they were painted on the surface."[51] The illustration he provided makes the same point for general practice. In this volume, Wilson Jones discusses a brick-faced arch he found in the west staircase of the Pantheon that can be seen to be toothed into the concrete. However, only an examination of the concrete core of the building itself could reveal whether its relieving arches were constructed of solid brick and mortar or brick-faced concrete.

(K) Concrete Vaults with Brick Linings.

The soffits of vaults in the mid-imperial period were often made of brick linings. These were laid like tiles (not on edge) on a centering to form the intrados of a concrete vault, and they remained attached when the concrete cured. The earliest-known example of this construction method appears in the barrel vaults at Trajan's Markets and other Trajanic structures, and it had been used experimentally in several different forms. In all known cases where the structure is visible, brick linings face vaults made of concrete, not of brick.[52] The intrados of the great arches of the Pantheon's exedras have a lining of bipedales; even if they could have been attached using mortar – they weigh about 25 kilograms each – they would not have been needed on the intrados of a solid brick arch or vault.

Conclusion

The round plan of the Pantheon provided a secure and permanent support for its dome. The almost exclusive use of masonry enabled a fireproof building to be constructed so as to avoid the fate of its predecessor, and the use of concrete enabled an unprecedented span. A rectangular portico was married to the cylinder by means of a transitional block in between, housing the stairs. Although previous buildings provided the elements for its design, none proved to be equally permanent, and no larger dome has ever been made of unreinforced masonry. A new means of construction was required to produce the desired effect.

While taking its cue from Agrippa's project, the Pantheon was created by combining design and structural features that had been used for at least six different building types. Baths provided precedents for domes or half domes with coffers and an oculus and an equivalent arrangement for the incorporation of trapezoidal stairs. Tombs provided a precedent for a windowless cylinder that was freestanding. Both tombs and theaters provided an example of a cellular structure and a geometrical method for laying out circular plans. Theaters provided models for conical barrel vaults and multiple levels of cellular structure. Basilicas offered examples of a forecourt, an attached portico, and a clerestory arrangement. Triumphal arches provided exemplars for the form and proportions for the transitional block. Temples provided precedents for a pedimented portico.

Of the precedents erected in the preceding decades, the octagonal hall of the Domus Aurea was the

most innovative, but it differs in many respects from the Pantheon. Its plan is more complex, and its use of light is more sophisticated, but its structure and method of construction are simpler. Compared with the Pantheon, there are other significant differences: the shape (with an octagonal plan and largely octagonal vault rather than a round plan and hemispherical dome), the lighting (with openings at a high level around the perimeter aside from the oculus), the decoration (with a plain intrados rather than coffers), and the structure (part of a larger building rather than freestanding). In addition, its relatively small and thin dome is monolithic. At Baiae, the even earlier Temple of Mercury is likewise relatively small and has a thin shell, and it too lacks coffers. This is also true of the more imposing Temple of Diana and the Temple of Venus, although these have windows in their walls, and it is uncertain if either was constructed earlier than the Pantheon. Regardless of their exact dates, none of the three domes at Baiae provides a close parallel with the Pantheon in terms of its design or construction, and all formed part of complexes rather than being freestanding. Tholoi are still less likely to have been directly influential in that none is definitely known to have had a dome, although they had circular peristyles rather than projecting porticoes.

The domes and half domes most nearly equivalent in scale and materials to the Pantheon had recently been constructed for Trajan's Baths and Trajan's Markets, one certainly and the other possibly designed by Apollodorus. Even though only the lower parts of their domes survive, enough remains of the coffering and other details to show just how important an influence the Baths undoubtedly were. As a more complete geometrical form, a dome has inherently more strength than a half dome, and since half domes had been successfully built that were 100 feet across, about two-thirds as wide as the Pantheon interior, these examples could well have suggested the practicality of constructing a still larger dome with the same proportions, as well as suggesting a similar approach to the incorporation of the stairs. There are some similarities in constructional technique, but this apparently did not extend to layers divided by through-courses of brick, of which only occasional use was made in the walls. Like the Pantheon, Trajan's Markets includes numerous concrete vaults with brick linings, as well as walls with concrete cores separated by layers of bipedales. Its half domes, however, were not constructed this way. Such qualifications aside, the largest number of design elements and constructional features of the Pantheon occur in buildings constructed during Trajan's reign.

At Hadrian's Villa several buildings have features in common with the Pantheon, but without more exact dating, they must be considered parallels rather than sources. The Serapeum of Hadrian's Villa provides the closest parallel for the way in which the Pantheon's walls were constructed. Both buildings have cellular walls thick enough to provide internal buttressing. The Roccabruna has step-rings, and the dome of the vestibule of the Piazza d'Oro was cantilevered inward to reduce the span that had to be fully supported by centering during construction.

Regardless of whether constructional refinements such as step-rings with through-courses were invented specifically to help cope with the enormous span of the Pantheon, they represent the culmination of centuries of development in the creation of space through the use of concrete. As impressive as its technical accomplishments are, though, the principal achievement of the Pantheon lies in its captivating and memorable space. The visual impact of the interior was greatly enhanced thanks to the dramatic chiaroscuro of the exedras, the articulation of the coffering, and the illumination that floods in through the ample oculus. These features and many others were derived from a wide variety of sources that can be identified directly or indirectly, but despite the extent of its multifaceted indebtedness to earlier architectural achievements, the design of the Pantheon exceeded the

achievements of its sources and set a new standard for the conception of interior space.

Mark Wilson Jones provided detailed advice that has improved every aspect of this chapter. When our conclusions differ, mine were reached reluctantly.

1 Domes with an oculus were used in bath buildings as early as the first century BC (Vitruvius, 5.11.5; see *Vitruvius: Ten Books on Architecture,* trans. Ingrid D. Rowland, commentary and illustrations by Thomas Noble Howe with additional commentary by Ingrid D. Rowland and Michael J. Dewar, New York 1999. Early examples are discussed in Fikret Yegül, *Baths and Bathing in Classical Antiquity*, Cambridge 1992, pp. 37–38, where the author provides persuasive evidence that domes "started with bath buildings" (p. 3).

2 The architect Georges Chedanne established that the existing Pantheon was constructed more than a century after Agrippa's death; he exhibited a drawing of the key brickstamps that he discovered and publicized his findings, but he never published them. They were, however, summarized by R. Phené Spiers, "Monsieur Chedanne's Drawings of the Pantheon," *Journal of the Royal Institute of British Architects* 2, 1895, pp. 180–182. The results of the excavations in 1892–1893 were published by Luca Beltrami (*Il Pantheon: La struttura organica della cupola e del sottostante tamburo, le fondazioni della rotonda, dell' avancorpo, e del portico, avanzi degli edifici anteriori alle costruzioni adrianee. Relazione delle indagini eseguite dal R. Ministero della Pubblica Istruzione negli anni 1892–93, coi rilievi e disegni dell' architetto Pier Olinto Armanini*, Milan 1898, and *Il Pantheon rivendicato ad Adriano 117–138 d.C.,* Milan 1929); Beltrami reconstructed Agrippa's Pantheon as a south-facing T-shaped structure. The evidence was limited, however, to a small piece of foundation; see Kjeld De Fine Licht, *The Rotunda in Rome: A Study of Hadrian's Pantheon*, Copenhagen 1968, p. 219, and Mark Wilson Jones, *Principles of Roman Architecture*, New Haven 2000, Fig. 3.3). For the recent excavations in front of the portico, see Paola Virgili and Paola Battistelli, "Indagini in piazza della Rotonda e sulla fronte del Pantheon," *Bullettino della Commissione Archeologica Comunale di Roma* 100, 1999, pp. 377–394.

3 Most of the ancient texts relating to Agrippa's Pantheon and the existing Pantheon can be conveniently compared in Licht 1968, pp. 180–183. Paul Godfrey and David Hemsoll argued that none of the three Pantheons was a temple. Noting that the present building is only known to have been used as a tribunal, they added that "despite their many uses, the imperial administration of justice was not conducted in temple buildings" (Godfrey and Hemsoll, "The Pantheon: Temple or Rotunda?" *Pagan Gods and Shrines of the Roman Empire*, ed. Henig et. al., Oxford 1986, p. 202).

4 Licht (1968, pp. 203–225) mentioned the importance of considering groups of features, but he discussed separately each building that was a possible source, rather than seeking clusters of features. MacDonald's book on the Pantheon contained his fullest treatment of its sources (William L.

MacDonald, *The Pantheon: Design, Meaning, and Progeny*, London 1976, pp. 44–75); cf. MacDonald, *The Architecture of the Roman Empire,* vol. 1:*An Introductory Study*, London 1965; 2nd ed. rev., New Haven 1982, for additional details. For a more detailed discussion of the sources for the Pantheon's design and construction, see Gene Waddell, *Creating the Pantheon: Design, Materials, and Construction*, Rome 2008.

5 Kjeld De Fine Licht, *Untersuchungen an den Trajansthermen zu Rom*, Copenhagen 1974. Dimensions for the exedras of the Baths of Trajan are given in meters and Roman feet in Wilson Jones 2000, p. 218.

6 The span of the central space of the Basilica Ulpia was 23.43 meters or 79.15 Roman feet (James Packer, *The Forum of Trajan in Rome: A Study of the Monuments*, Berkeley 1997, folio 25). Some early reconstructions reproduced by Packer show the exedras of the Basilica Ulpia with half domes like the exedras of Trajan's Baths, but subsequent archaeological evidence has established that their roof structures were not vaulted. Recent excavations of Trajan's Forum have been interpreted differently; see Roberto Meneghini, "Il foro Traiano. Ricostruzione architettonica e analisi strutturale," *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung* 108, 2001, pp. 245–268, and James Packer, "Templum Divi Traiani Partici et Plotinae: a Debate with R. Meneghini," *Journal of Roman Archaeology* 16, 2003, pp. 109–136; some uncertainty remains about how its east and west ends were configured. The dates for Trajanic buildings are from Amanda Claridge, *Rome: An Oxford Archaeological Guide*, Oxford 1998, pp. 161–164, 170–172, and 288–290. The diameter of the Maritime Theater or "Island Enclosure" is 44.20 meters or 148.5 Roman feet (William L. MacDonald and John Pinto, *Hadrian's Villa and Its Legacy*, New Haven 1995, p. 82).

7 For the construction of Trajan's Markets, see Lynne Lancaster, "Building Trajan's Markets," *American Journal of Archaeology* 102, 1998, 283–308, and Lynne Lancaster, "Building Trajan's Markets 2: The Construction Process," *American Journal of Archaeology* 104, 2000, pp. 755–785. Trajan had the end of the Quirinal cut away and terraced to provide room for his forum. On the use of retaining walls by the Romans, cf. Vitruvius 6.8.7. MacDonald (1976, p. 58) argued that "the Market hall is a rectilinear forerunner of the Pantheon."

8 MacDonald 1976, pp. 54–55. The width of the Domus Aurea is given by Wilson Jones (2000, p. 218) as 49.49 feet or 14.65 meters measured from corner to corner.

9 On the bath buildings at Baiae, see Yegül 1992, pp. 107–110, and Amedeo Maiuri, *Phlegraean Fields from Virgil's Tomb to the Grotto of the Cumaean Sybil*, Rome 1947, pp. 61–73. The dates assigned for these structures vary widely, being based on constructional comparisons thought to be more securely dated, but it is often uncertain how long methods of construction persisted. For example, Yegül dates the Temple of Mercury from the late Republican to the early Julio-Claudian period, and likewise the "Temple of Apollo" at Lake Avernus, which has a span of 36.6 meters.

However, Maiuri dates the latter to the reign of Nero (Maiuri 1947, pp. 139–141), though it has also been dated to the Antonine period (M. E. Blake, *Roman Construction in Italy from Nerva through the Antonines*, Philadelphia 1973, p. 270).

10 The Domitianic hall at Albano has a dome with an oculus, but like those at Baiae it formed part of a larger structure. The Forum Baths at Pompeii has an earlier example of an oculus, but this lit a conical vault (Licht 1968, pp. 211–215). The oculus was also used to regulate the temperature by partially closing it (Vitruvius, 5.10.5). No dome of a bath building is known to have had coffers.

11 MacDonald and Pinto 1995, pp. 28–29 (site description). For detailed accounts of excavations, see S. Aurigemma, *Villa Adriana*, Rome 1961. For dates of construction, see A. C. GSmith, "The Date of the Grandi Terme of Hadrian's Villa at Tivoli," *Papers of the British School at Rome* 46, 1978, pp. 73–93.

12 Dimensions for these buildings are given by Wilson Jones (2000, pp. 217–219). Although Renaissance architects such as Palladio reconstructed such *tholoi* with domes, I have been unable to find any dome fragments for these three examples. The entablatures of the two tholoi in Rome have been destroyed, and at Tivoli nothing of the wall survives above the level of the entablature (Richard Delbrueck, *Hellenistiche Bauten in Latium*, Strassburg 1907, Figs. 18 and 28). Unlike the Pantheon the tholos in the Largo Argentina has a podium and an altar in front of its steps and so was unquestionably a temple. Although it has been considered a possible source for the Pantheon, the date when its portico was added is uncertain, and it did not have a transitional block. MacDonald (1976, pp. 67–68; Figs. 77–78) judged this tholos to be a "remote precedent," but he observed that adding a portico to a drum "had not been done before" [the Pantheon]. For Licht, this tholos was not "either a basis or even a model," but was worthy of note (Licht 1968, pp. 218–219). He knew of no definite evidence for an earlier rotunda that was freestanding (p. 207). The Hellenistic Arsinoeon at Samothrace was large (about 60 feet in diameter), cylindrical, and freestanding, but it was roofed with wood, and it was not nearby, not contemporary, and not well known (cf. MacDonald 1976, p. 49 and Figs. 42 and 51).

13 Godfrey and Hemsoll 1986, p. 204.

14 For persuasive evidence that the Pantheon was intended to have a taller portico with a gabled roof, see Paul Davies, David Hemsoll, and Mark Wilson Jones, "The Pantheon: Triumph of Rome or Triumph of Compromise?" *Art History* 10, 1987, pp.133–153, and Wilson Jones 2000. Chapter Seven here provides further evidence (including foundations that could support larger columns and the set-back in the profile of the transitional block that ties in with the upper pediment).

15 Blake 1973, pp. 12–15, n. 65; p. 17. Spartianus, *Hadrian* 19.9–10. Rodolfo Lanciani, *Forma Urbis Romae*, Rome 1893–1901, repr. Rome 1988.

16 Jürgen J. Rasch, *Das Mausoleum bei Tor de' Schiavi in Rom*, Mainz 1993. C. Briggs, "The 'Pantheon' of Ostia (and Its Immediate Surroundings)," *Memoirs of the American Academy in Rome* 8, 1930, pp. 161–169; frontispiece and Plates 51–57. R. Meiggs, *Roman Ostia*, 2nd ed., Oxford 1973. On the possible exception, the tholos in the Largo Argentina, see n. 12 herein. Wilson Jones 2000 (p. 182 and Fig. 9.6) notes similar plans of earlier circular buildings at Stymphalos and Athens, but neither is known to have been domed.

17 Lynne Lancaster, "*Concrete Vaulted Construction: Developments in Rome from Nero to Trajan,*" Ph. D. diss., Oxford 1996, pp. 103–104, 247. The plan of Trajan's Baths by Gismondi (Fig. 5.2 herein) designates the three best-preserved exedras differently from the plan in Licht's 1974 monograph; Gismondi's B, F, and C are Licht's H, L, and D, respectively.

18 Square coffers had been used centuries earlier to articulate flat ceilings in Greek temples, and were adapted and used nonstructurally by the Romans for concrete structures. Roughly, square coffers had been used as early as about 100 BC on a double-curving barrel vault at Praeneste (Palestrina). In the Pantheon, coffers are a major unifying element of the interior. As MacDonald (1976, pp. 72–74) pointed out, their corners align in such a way as to create the impression of interlocking spirals. The effect achieved is similar to that of the diamond-shaped coffers in the apses of the Temple of Venus and Rome as rebuilt around AD 300.

19 Charles Cameron, *The Baths of the Romans Explained and Illustrated: with the Restorations of Palladio Corrected and Improved*, London 1772, Plate 7. Yegül (1992, p. 146) gives the somewhat larger dimension of 27 meters.

20 Licht 1974, Supplementum, Fig. 8 "S."

21 The Tor de' Schiavi and the Rotunda at Ostia have similar arrangements.

22 Wilson Jones (2000, pp. 194–196) lists other means used to emphasize axes inside the Pantheon, some of which are so subtle as to be easily overlooked.

23 M. E. Blake, *Roman Construction in Italy from Tiberius through the Flavians*, Washington, DC 1959, pp. 89–90. Rose granite was used for the Temple of Peace and gray for the Basilica Ulpia.

24 Packer 1997, p. 434; Wilson Jones 2000, p. 223.

25 Some city gates had similar arrangements with openings aligning rather than orders of different sizes (cf. Wilson Jones 2000, p. 116 and Fig. 6.12). On the exterior of the Pantheon, the largest

cornice is at the top of the wall (as for the Colosseum), but on the interior, the largest cornice was used with the larger order, and the smaller order was treated more like the attic story of a triumphal arch (cf. Licht 1968, Figs. 99 and 100).

26 William C. Loerke ("A Rereading of the Interior Elevation of Hadrian's Rotunda," *Journal of the Society of Architectural Historians* 49, 1990, pp. 22–43) discussed convincingly how the attic story of the Pantheon's interior reflects the structure of the building.

27 Licht 1974, Plates 1 and 3. On size and proportion in Roman architecture, see Wilson Jones 2000.

28 The width between the centers of end columns on the front of the portico is 32.03 meters and the height of the transitional block is 32.23 meters (Wilson Jones 2000, p. 220).

29 Packer 1997, folio 24. MacDonald and Pinto 1995, p. 82. In his book on the Pantheon, MacDonald makes a detailed comparison of the Forum of Augustus and the Pantheon, particularly in regard to the possible meanings that both buildings had for the Romans (MacDonald 1976, pp. 84–91). Most notably, the exedras of the Forum have a radius of 75 feet, the same radius as the Pantheon, but were not vaulted and were not fully hemispherical. Their influence would have been primarily in terms of scale.

30 On the use of whole number or "round" dimensions, see Mark Wilson Jones, "Principles of Design in Roman Architecture: The Setting out of Centralised Buildings," *Papers of the British School at Rome* 57, 1989, pp. 106–151; Wilson Jones 2000, pp. 71–84.

31 The Pantheon's diameter from wall facing to wall facing is 43.57 meters (147.20 Roman feet) and from column center to column center is 44.52 meters (150.41 Roman feet); Wilson Jones 2000, p. 220.

32 The order of the attic including its running pedestal is 30 feet tall, and the order of the main story is 45 feet (Wilson Jones 2000, p. 185).

33 Wilson Jones 2000, pp. 135–156.

34 A ratio of about 1:8 was considered sufficient for most domes and about 1:10 for most barrel vaults (Wilson Jones 2000, pp. 82 and 233 n. 38, citing Janet DeLaine, *The Baths of Caracalla in Rome: A Study in the Design, Construction, and Economics of Large-Scale Building Projects in Imperial Rome* (*Journal of Roman Archaeology*, Supplement 25), Portsmouth, R.I., 1997; Jürgen

Rasch, “Zur Konstruktion spätantiker Kuppeln vom 3 bis 6 Jahrhundert,” *Jahrbuch des deutsches Archäologischen Instituts* 106, 1991, pp. 311–383).

35 Through-courses had earlier been used intermittently in the Colosseum and in Trajan’s Baths (Lancaster 1998, p. 285). In the Mausoleum of Augustus, horizontal sections of concrete were separated by layers of limestone chips (personal observation; cf. H. Von Hesberg and S. Panciera, *Das Mausoleum des Augustus. Der Bau und seine Inschriften,* Munich 1994). In Domitian’s Nymphaeum at Albanum, the sections were separated by layers of pozzolana (Blake 1959, p. 138).

36 Lancaster 1996, vol. 1, p. 209, and Fig. 110B.

37 D. Moore, *The Roman Pantheon: The Triumph of Concrete*, Wyoming 1995. Francesco Piranesi, *Seconda parte de’templij antichi che contiene il celebre Pantheon,* Rome 1790, Plates 10 and 29, illustrated two different structures for the dome of the Pantheon. In the earlier version, he showed brick ribs, but in the later one, he showed that the step-rings were separated by through-courses. Horizontal layers of bricks (*tegole*) had been shown previously on the intrados by Antonio da Sangallo il Giovane (Waddell 2008, Fig. 58B).

38 The span of the Serapeum is about 54 feet or approximately one-third as much as the Pantheon (R. Vighi, *Villa Hadriana*, trans. J. B. Ward Perkins, Rome 1958). Another similarity shared with the Pantheon is that of nonalignment; the seven segments of the vault of the Serapaeum do not align with the nine openings in its walls (MacDonald and Pinto 1995, p. 112).

39 Being so much smaller, the Serapeum could conceivably have been completed early enough to have been a source for the Pantheon’s dome. For the excavation of the Serapaeum and the surrounding area of the Canopus, see S. Aurigemma, “Lavori nel Canopo di Villa Adriana,” *Bollettino d’Arte* 39, 1954, pp. 237–341. Most of the principal buildings at Hadrian’s Villa, including the Serapaeum and Roccabruna, have bricks stamped with the names of consuls for the year 123, and many have stamps from 124 (Herbert Bloch, *I bolli laterizi e la storia edilizia romana. Contributi all’archeologia e alla storia romana (1936–1938)*, Rome 1947, pp. 137–141). The Piazza d’Oro and the domes of the Large and Small Baths have brick manufactured a few years later. A total of 279 brickstamps with the names of consuls were found while excavating the Canopus from 1950 to 1955, and they were analyzed by Domenico Faccenna: 189 were manufactured in AD 123, 11 in AD 124, 17 in AD 125, 61 in AD 126, and 1 in AD 127 (Aurigemma 1961, p. 127).

40 Piranesi was probably also misled by the use of these ladder-like ribs during the Severan period for renovating a part of Agrippa’s Baths known as the Arco della Ciambella, particularly since it lies so close to the Pantheon and was also believed to have been created by Agrippa. See Licht 1968, p. 297.

41 MacDonald and Pinto 1995, p. 113. Martines also emphasizes the importance of these wall cells for the construction of the Serapeum and the Pantheon (Giangiacomo Martines, "La struttura del Pantheon velut regionem fornicatam," *Quaderni dell'Istituto di Storia dell'Architettura* 41, 2004, pp. 3–16, p. 7 n. 29, and Chapter Four in this volume).

42 Von Hesberg and Panciera 1994, Figs. 1 and 2 and Plate 3c.

43 Lynne Lancaster, *Concrete Vaulted Construction in Imperial Rome: Innovation in Context*, Cambridge 2005, p. 167.

44 Alberto Terenzio, "La Restauration du Panthéon de Rome," *Museion* 20, 1932, Plates 10–11.

45 J. DeLaine, "Structural Experimentation: The Lintel Arch, Corbel, and Tie in Western Roman Architecture," *World Archaeology* 21, 1990, pp. 416–417.

46 Lancaster noted that the earliest "relieving arches ... of bricks or tiles" were used in the Augustan period and that bricks were used later to create "voussoirs" of concrete (Lancaster 2005, pp. 88 and 94). However, she usually interpreted vaults faced with bipedales as having a solid arch of bipedales rather than as being made of concrete voussoirs. She reconstructed the great arches of the Pantheon as consisting wholly of bipedales (2005, p. 97; Fig. 80).

47 The broad arch that serves as the main entrance to the main hall of Trajan's Markets shows on the intrados that most of its bipedales extend much less than two feet into the concrete. A prerestoration set of photographs made of Trajan's Markets shows that the arches of its hemicycle were also constructed using concrete voussoirs (Instituto Centrale per il Catalogo e la Documentazione, Ministero Beni e le Attivita Culturali). One photograph from this series is reproduced by Giovanni Teresio Rivoira (*Roman Architecture and Its Principles of Construction Under the Empire with an Appendix on the Evolution of the Dome Up to the 17th Century*, New York 1972, a translation of Rivoira, *Architettura Romana*, Milan 1925), Fig. 126. Arches with flat lintels were made of concrete as early as the end of the second century BC (DeLaine 1990, pp. 416–417).

48 This aqueduct was constructed of concrete by Nero and was reinforced using concrete in ca. AD 201 by Septimius Severus and Caracalla (Esther Boise VanDeman, *The Building of Roman Aqueducts*, Washington 1934, pp. 266–270).

49 The consensus of opinion is that the Pantheon's great arches are made wholly of bipedales and mortar rather than concrete with a brick facing: Auguste Choisy, *L'art de bâtir chez les Romains*, Paris 1873; Rivoira 1925; Terenzio 1932; Licht 1968; MacDonald 1982; Moore 1995; Lancaster 2005; Gerd Heene, *Baustelle Pantheon: Planung, Konstruktion, Logistik*, Düsseldorf 2004;

Giovanni Belardi, *Il Pantheon: storia, tecnica, e restauro*, Viterbo 2006.

50 The function of a buttress is primarily to resist lateral thrust, while the function of an arch is to support and transfer weight to either side of an opening. For a diagram with the buttresses of the main hall in Trajan's Markets see MacDonald 1982, Plate 93. How the buttress on the south side of the Pantheon terminated is uncertain. Licht (1968, p. 159) reconstructs a half arch extending upward against a wall of the Basilica of Neptune. Heene (2004, p. 63) reconstructs a half arch extending downward above the apse of the basilica.

51 J. H. Middleton, *The Remains of Ancient Rome,* 2 vols., London 1892, pp. 1, 60.

52 For the extensive use of brick linings for the concrete vaults in Trajan's Markets, see Lancaster 1998, p. 283; Lancaster 2000; Lancaster 2005, pp. 31, 32, 176, and 207.

Six The Pantheon Builders: Estimating Manpower for Construction

Janet DeLaine

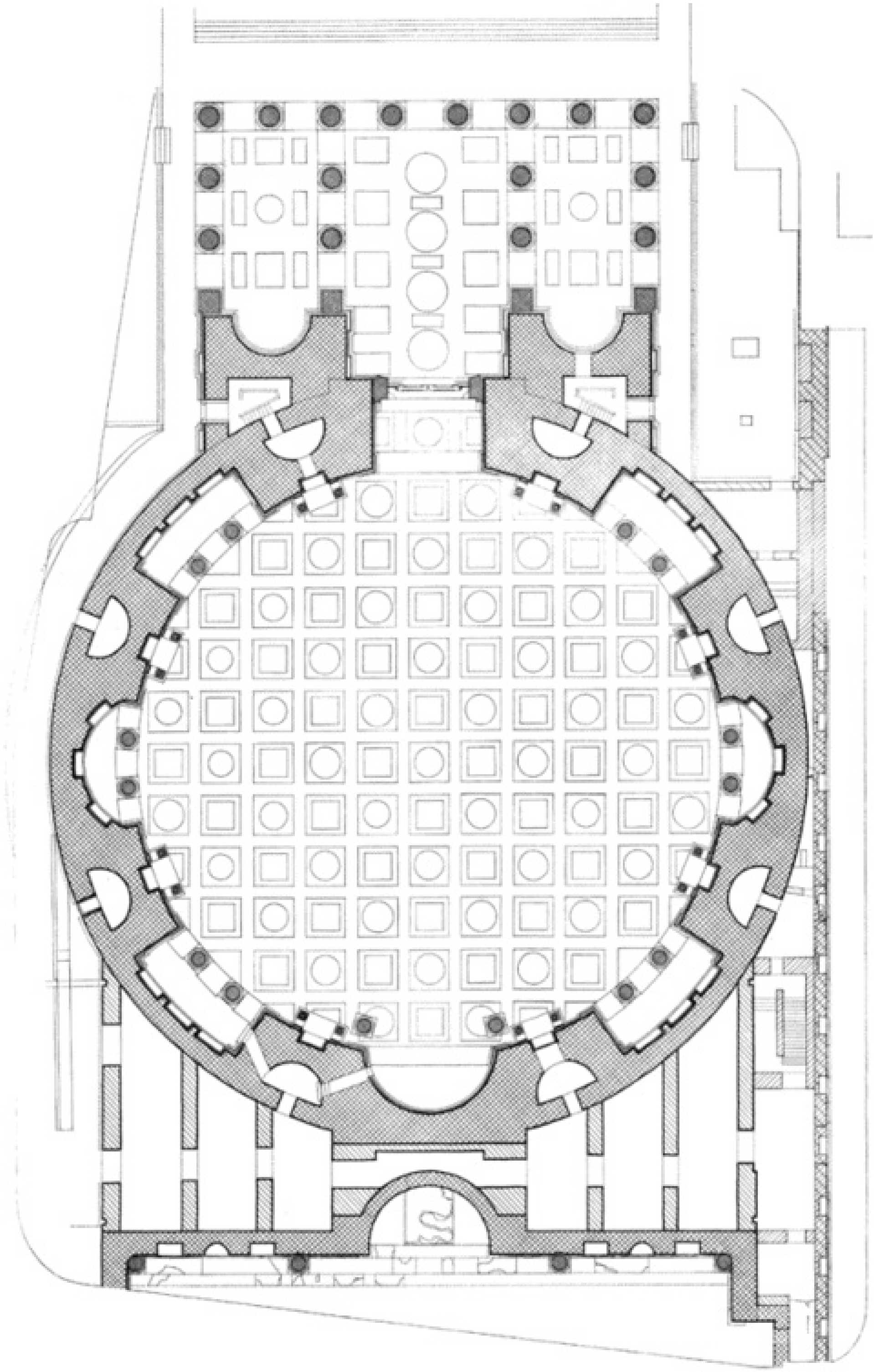
Introduction

The Pantheon has long had iconic status, universally acknowledged as the greatest achievement of Roman architecture and one of the wonders of the Roman world. The unparalleled clear span of the dome particularly impressed later architects and engineers, who used it as a point of reference for their own wide-span structures, including the domes of Santa Maria del Fiore in Florence, St. Peter's in Rome and St. Paul's in London, and even the great Victorian train sheds of St. Pancras Station.[1] A major part of the universal fascination with the building lies in its complex structural system and the constructional processes employed, particularly in relation to the dome.[2] Because of the difficulties we have with understanding the Pantheon as a structure, it has been natural to imagine that it was also an exceptionally difficult, time-consuming, and labor-intensive construction project for the Romans. The aim of this chapter is to test some of these assumptions, using a method of reverse quantity surveying, originally developed for the Baths of Caracalla in Rome.[3] This can provide a rough estimate of the minimum manpower requirements for the actual construction on site (excluding all labor relating to the production, supply, and transportation of materials to the site), as well as the minimum construction period. Although the calculations can yield only approximate and hypothetical minimum figures, they at least provide an idea of the scale of the project in terms of manpower, and allow us to test whether this really was the "mammoth undertaking" assumed by many scholars.[4] This also has implications for how we see the Pantheon as part of the building projects of Trajan and Hadrian.

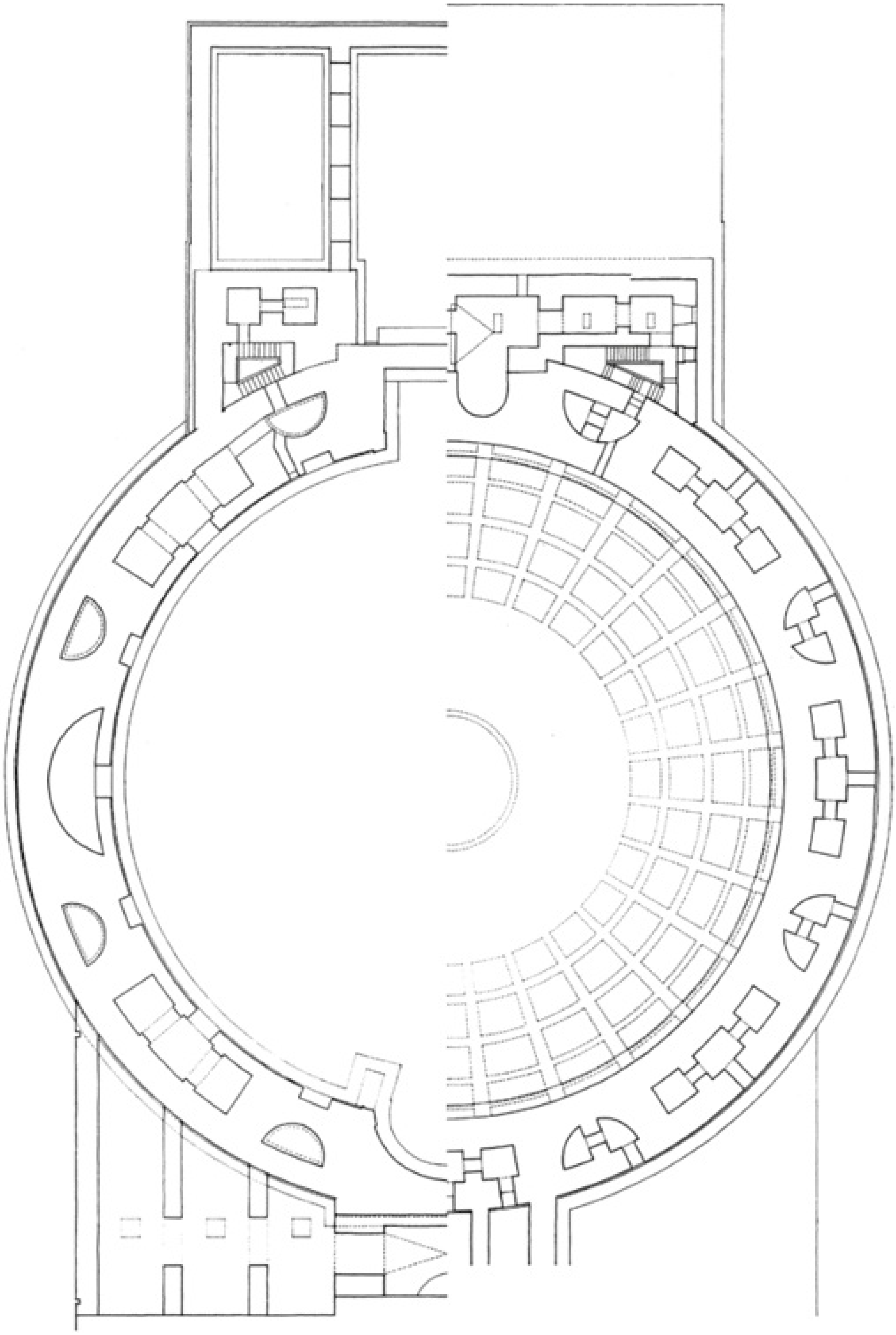
Construction Analysis

The first requirement in estimating manpower is an understanding of the physical fabric in order to calculate volumes of materials and assign human actions to putting them into place. In essence, the Pantheon, as can be seen in the set of line drawings published by Kjeld De Fine Licht (Figs. 6.1–6.5), consists of a circular drum (the rotunda), divided in plan into eight piers by alternately rectangular and semicircular recesses. This drum supports a dome that is roughly hemispherical in profile on the inside, while the exterior of the drum is divided into three zones (lower, middle, and upper), the upper zone rising to approximately one-third of the height of the dome. On the entrance side there is a rectangular structure (the intermediate block), which links the rotunda to the columnar pedimented portico forming the main facade. The intermediate block is also divided by cornices into three registers, equivalent to the three exterior zones of the drum. At the opposite end, at the rear of the rotunda, is a series of parallel barrel-vaulted chambers (the *grottoni*) built between the Pantheon and the probably contemporaneous Basilica of Neptune to the south (Fig. 6.5).[5] The Pantheon once sat at

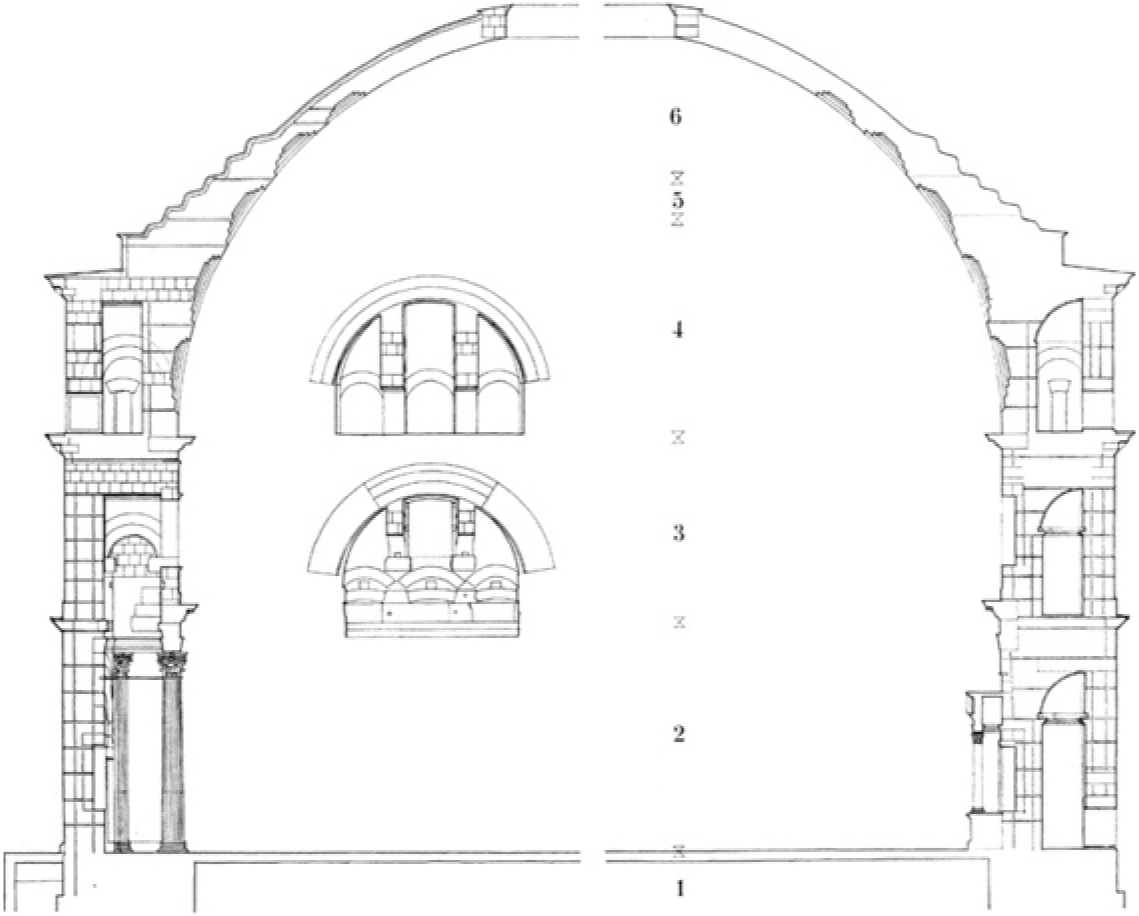
the head of acolonnaded precinct, but this will not be included in the calculations here. While it is not necessary for the purpose of this exercise to describe the whole of the fabric of the building in detail, some explanation will be givenfor the assumptions and approximations used where evidence is limited or details are open to various interpretations.



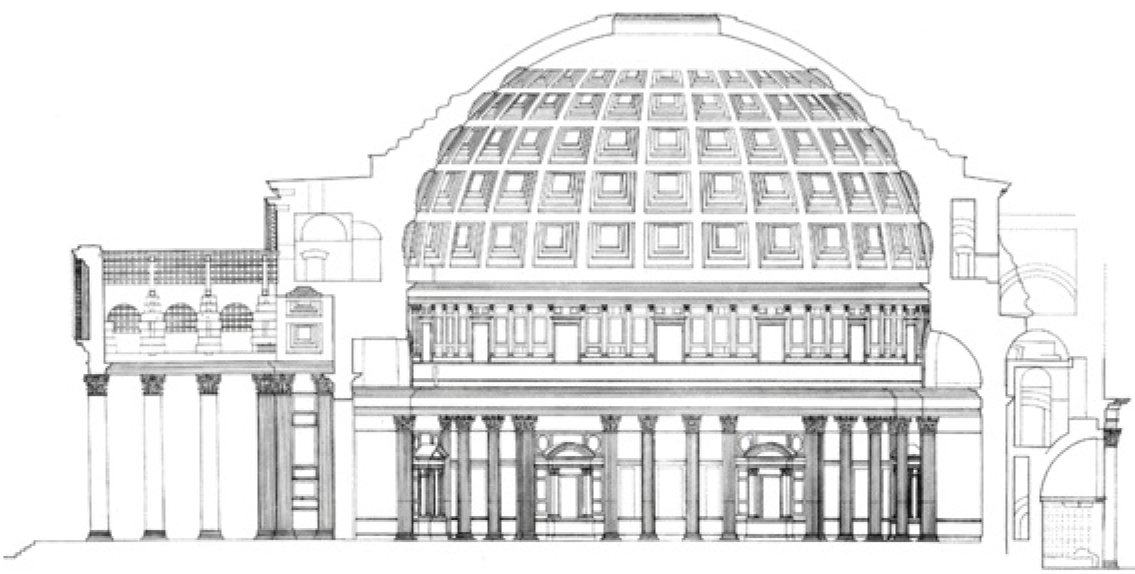
6.1. Ground plan. (Licht 1968, Fig. 98)



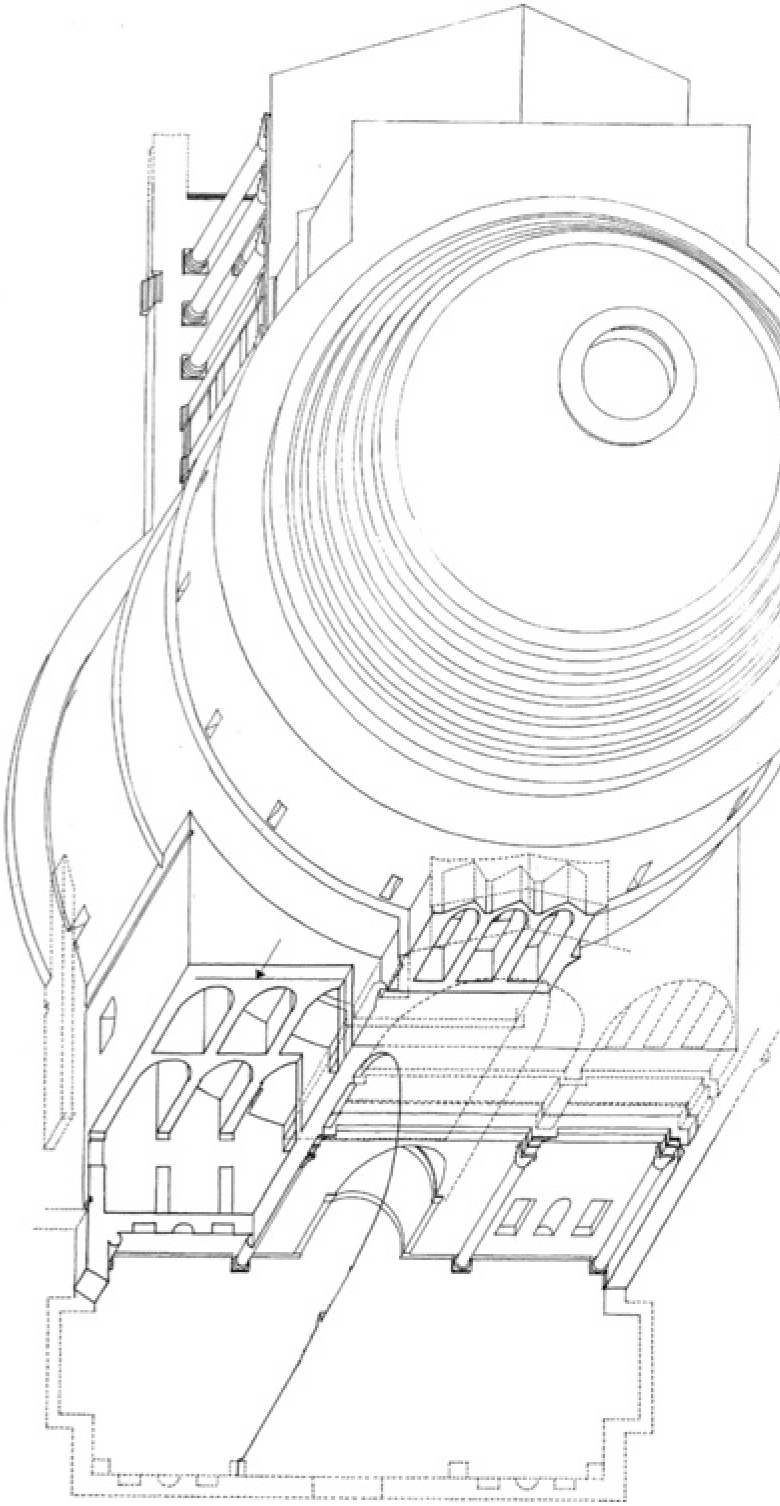
6.2. Half plans of upper levels. (Licht 1968, Fig. 97)



6.3. Half sections through the rotunda. The annotations refer to different types of aggregate, for which see Fig. 1.12. (Licht 1968, Fig. 99)



6.4. Longitudinal section. (Licht 1968, Fig. 105)



6.5. Isometric rendering from rear, showing the so-called grottoni (grottoes), the Basilica of Neptune, and the triple-arched connection or "bridge" between the two at high level. (Licht 1968, Fig. 175)

The Rotunda, Intermediate Block, and Grottoni

The rotunda and intermediate block, while not entirely without difficulty, are the easiest parts of the Pantheon to analyse in terms of construction and have been the parts most discussed in the literature.[6] Much less has been written about the grottoni, but the basic construction of the lower parts is virtually identical to that of the Rotunda. All walls are made of a uniform brick-faced concrete, with approximately 70 pieces of brick per square meter of facing, based on the average size of the brick pieces and the mortar joints. The materials of the core are less easy to measure and, as is well known,

the *caementa* (rubble aggregate) in the rotunda change through its height. Nevertheless, the size of the pieces of rubble does not necessarily change, remaining roughly fist sized, and what evidence we have suggests that an average figure of 5,000 pieces of caementa per meter cubed is a sensible assumption.

The brick arches, which are such a feature of the external face of the drum, are an important part of the structure of the rotunda; following earlier scholars, these are assumed to pass through the whole thickness of the drum and be made of solid brick, although this has in fact never been proven.[7] These and most of the other arches that appear on the face of the structure are made of *bipedales*, although a few of the smaller ones are of *sesquipedales*. The bridge above the grottoni rests on a solid brick vault of very similar construction. Also of bipedales are the level courses of bricks (the so-called bonding courses), which run right through the thickness of the fabric at regular intervals. At more than 25 kilograms each, bipedales require careful handling and cannot be laid at the speed of ordinary bricks, a point that also needs to be taken into account in the calculations.

The construction of both the brick-faced concrete and the arches can be broken down into simple actions carried out by individual masons, and all of the materials that need to be put in place – bricks, rubble aggregate, mortar – are sufficiently small and light to be carried by individuals as well, most probably in baskets. The only exception is the main interior order of the rotunda, which requires a very different range of materials and skills that are more difficult to quantify. Stone working needs specialized labor, and most elements, particularly the monolithic marble shafts weighing more than 20 tonnes each, need special equipment and large teams of men to raise and guide into position.

The most difficult element for analysis is the dome. The basic fabric, especially up to the top of the step-rings visible on the exterior, is little different from that of the drum of the rotunda, and similar skills and actions were required for putting the concrete in place, although the caementa are larger and lighter so that 4,000 pieces per meter cubed is a better estimate. The real difficulties lie in attempting to reconstruct the formwork and centering used to support the concrete while it cured, which in turn affects the sequence of construction. Since there is no consensus about this among scholars, and to argue the case is beyond the scope of this study, here it is assumed that the lower part of the dome up to the top of the drum is cantilevered out and does not require full centering (see Chapter Seven), but that the upper part of the dome from the top of the level of the drum is erected as a series of rings over a complete centering.

The Portico

The same kinds of skills required for the erection of the interior order of the rotunda are also necessary for the traditional masonry construction of the portico (see Fig. 1.1 and Plate I). The demands here are greater, however, since the elements are heavier (the 40-Roman-foot granite column shafts weigh more than 50 tonnes each), and the heavy blocks of the entablature and tympanum need to be raised to greater heights, involving even more specialized equipment and even larger groups of men. The main problem with understanding the portico construction, however, is that the current supports for its roof are not ancient. The roof has been much altered since antiquity, acquiring its present state in the 1920s, leaving many questions still to be resolved.[8] Although sufficient drawings of the ancient bronze trusses that were robbed in the 1620s remain for a basic reconstruction,[9] the roof may have been part of the restoration program of Septimius Severus,[10]

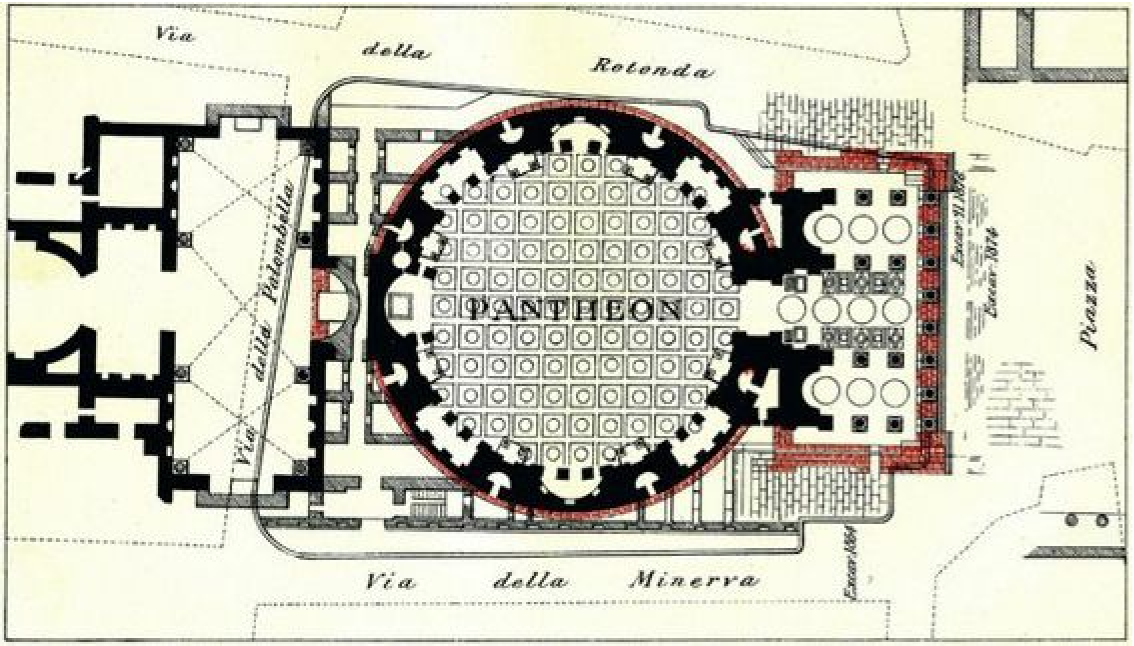
leaving open the strong possibility that the bronze trusses are Severan and that the older roof was of a more traditional timber construction.[11] Even if the bronze trusses were original, reconstructing the manpower figures for their manufacture and construction, if indeed possible at all, would require a separate study. Thus, the calculations here are based on a traditional timber truss structure similar to the current system but with marble roof tiles.[12]

Groundwork, Foundations, and Substructures

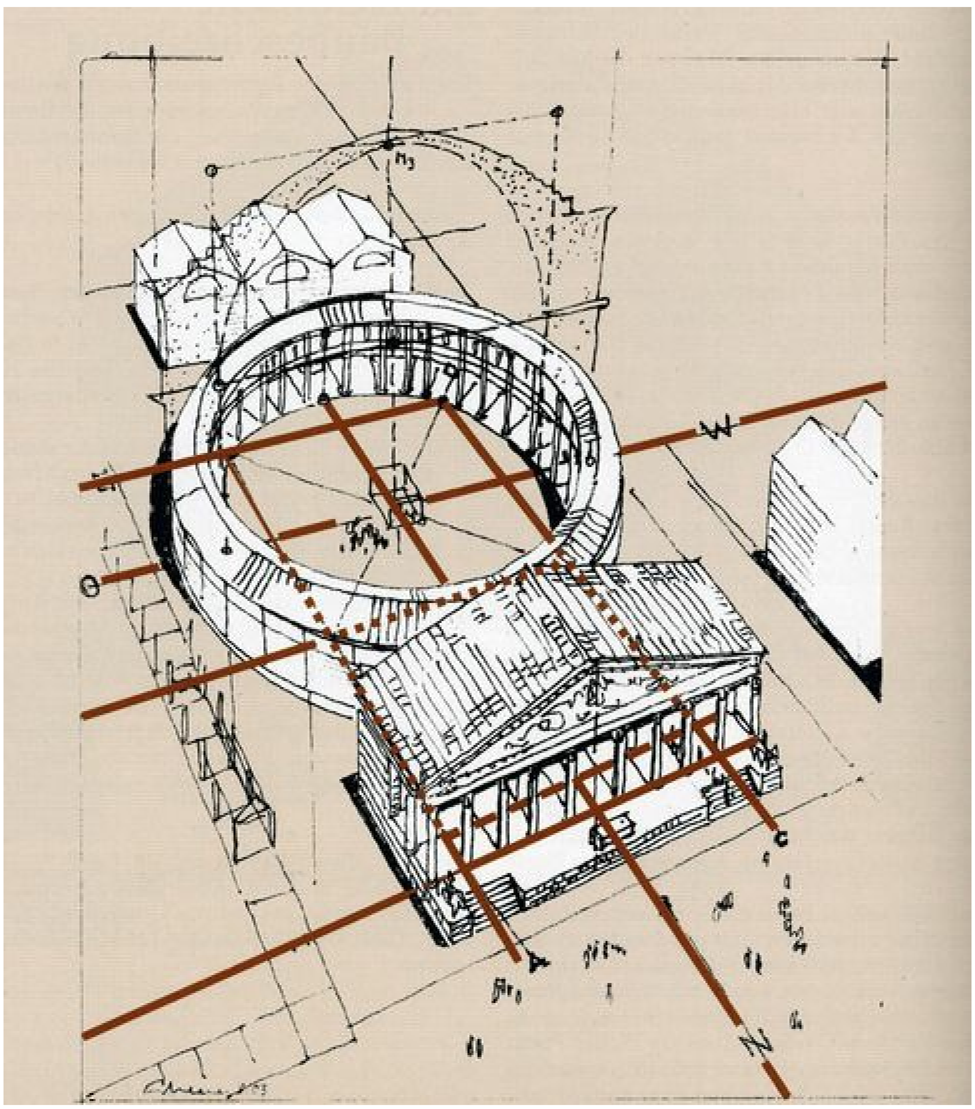
The least straightforward elements of the overall construction to assess are the groundworks and foundations, so that any result can only be a broad approximation. The foundations of the portico incorporated substantial amounts of an earlier ashlar building, presumed to be part of the original Agrippan Pantheon, which were partly reworked to support the front row of columns, while new concrete foundations were created for the side and internal rows.[13] In contrast, earlier structures were removed rather than reused from the foundation trenches for the grottoni, as for the rotunda itself, before the concrete was laid (see Fig. 2.6).

Since the portico of the present Pantheon lies about 1.4 meters higher than its predecessor, and its internal floor was closer to 2 meters higher than before, the earlier building need only have been demolished to roughly the new higher level, not to its foundations. This would have saved time and manpower. On the other hand, allowance has to be made for raising the overall level of the internal floors of the whole building, creating further need for labor. This seems to have happened before the foundation trench for the present rotunda was dug, as the interior face of the foundation appears to have been cast in a trench to just below the current floor level (see Fig. 2.4 and Plate XVIII). This is in contrast to the upper part of the foundation externally, which is built of brick-faced concrete and higher than the external early second-century ground level, forming a low ring podium.

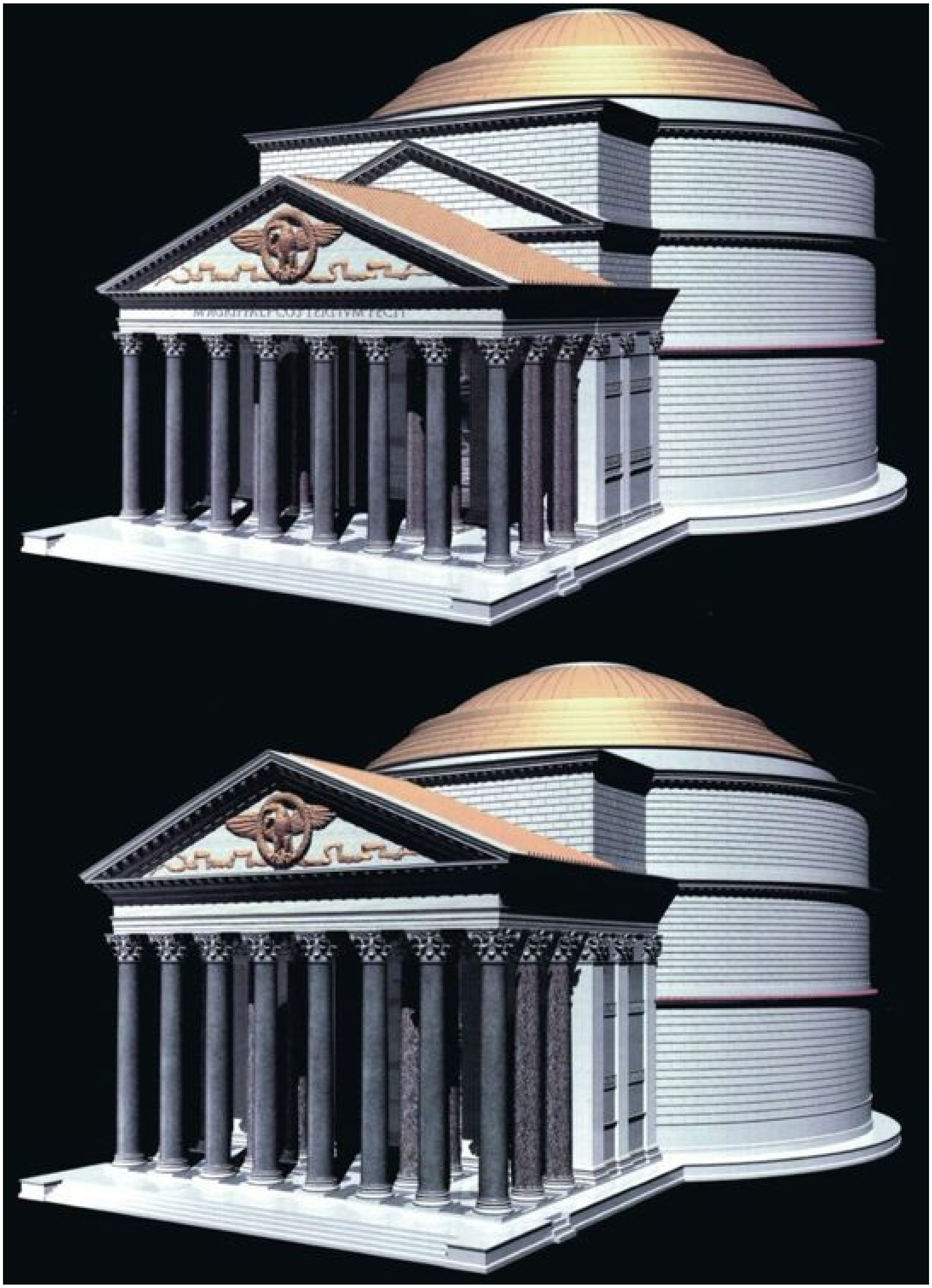
XIII. Visualization of the sequence of operations in building the Pantheon. (Model Mark Wilson Jones and Robert Grover)



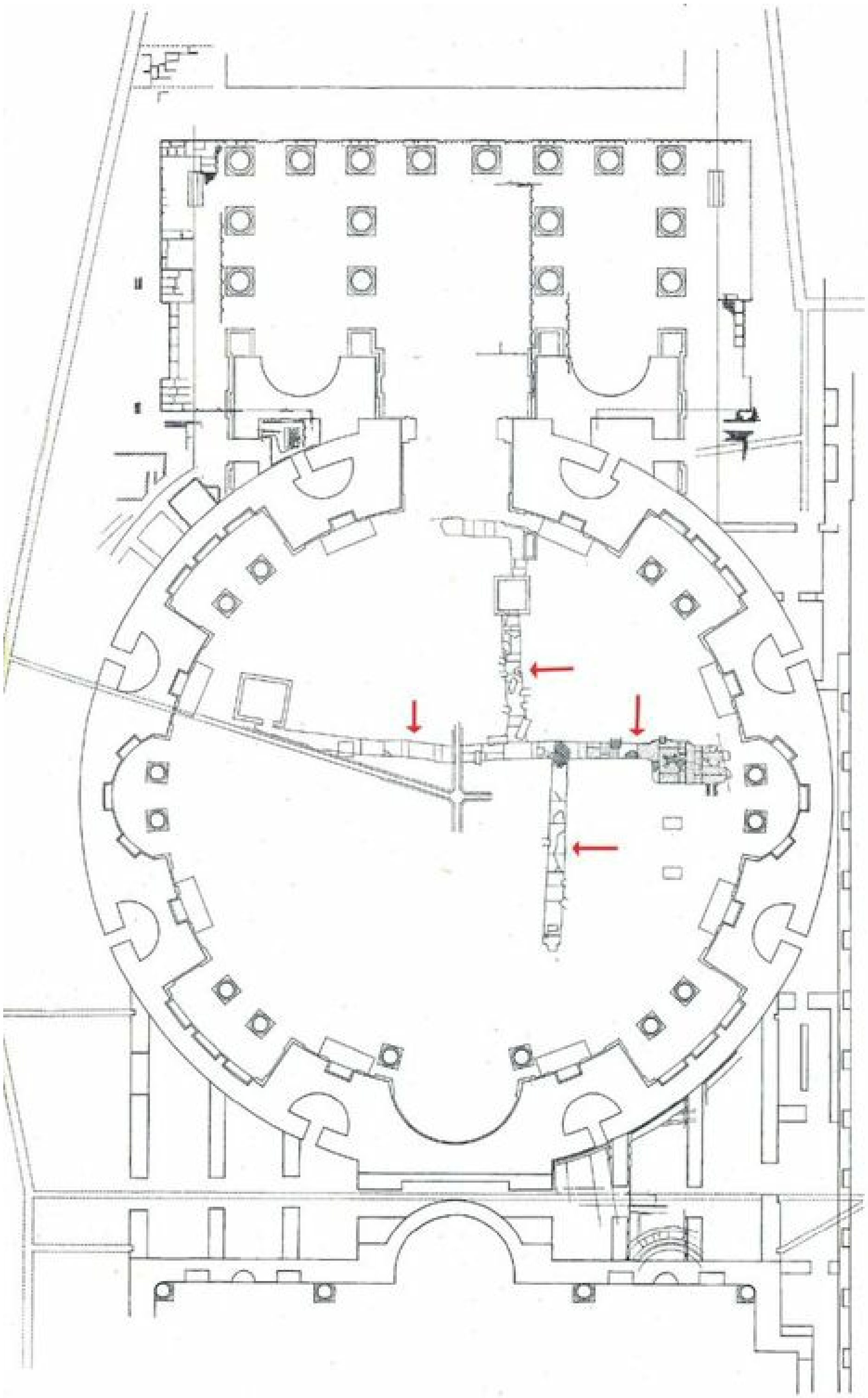
XIV. Plan of Pantheon (in black) overlaid with reconstruction of Agrippa's Pantheon (in red), according to Rodolfo Lanciani 1897


XV. Schematic reconstruction of Augustan Pantheon, according to Gerd Heene 2004.

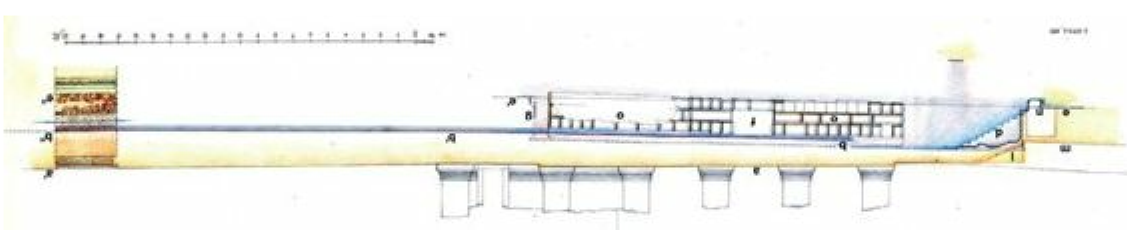
XVI. Aerial view of alignment between Pantheon and Mausoleum of Augustus. (P. Vergili, "Scavi in piazza della Rotonda e sulla fronte del Pantheon," in Grasshoff, Henzelmann, and Wäfler 2009, Fig. 10)



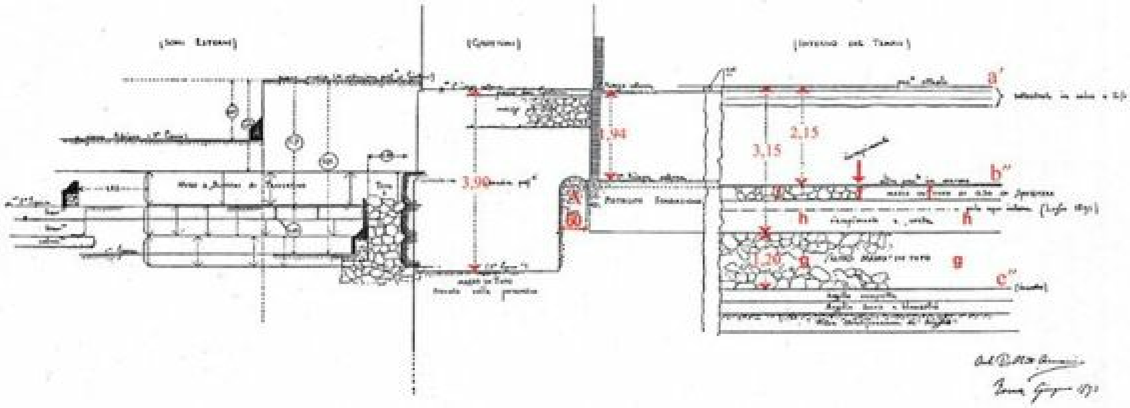
XVII. Pantheon, reconstruction views, intended (below) and as executed (below). (Model John Burge)



XVIII. Plan of 1891–1892 excavations. Red arrows point to trenches exposing earlier floor. (Beltrami 1898)



XIX. Composite section combining information from excavations under portico and rotunda. (Drawing Giovanni Joppolo)



XX. Section detail of 1891–1892 excavations illustrated in Figure 2.3, looking toward pilaster framing east side of entrance portal. (Pier Olinto Armanini in Beltrami 1898)

The nature of the foundations raises further problems. Although it is widely presumed that the foundations of the rotunda are about 4.5 meters deep and rest on clay, the situation is in fact more complex. The upper part, forming the podium externally, is about 2 meters above the early second-century ground level, and thus structurally more part of the building than of the foundations, which implies that the foundations proper would be only 2.5 meters deep. It is also clear from Armanini's summary drawing of the late nineteenth-century excavations of the Pantheon foundations that most of these are cut into a constructional fill, as the natural clay lies slightly below the base of the earlier travertine wall under the portico. From the foundations of other major Roman buildings of similar height, such as the Flavian Amphitheatre (ca. 7 meters into alluvium and bedrock plus ca. 6 meters of substructures), the Baths of Caracalla (6.5 meters into clay plus 8 meters of substructures), or the Domitianic Triclinium on the Palatine,[14] we would expect the foundations to be deeper in themselves and bedded further into the underlying natural geology. Even minor buildings such as the Trajanic/Hadrianic *insulae* at Ostia, at approaching half the height and a fraction of the span of the Pantheon, often have foundations more than 3 meters deep extending into the subsoil.

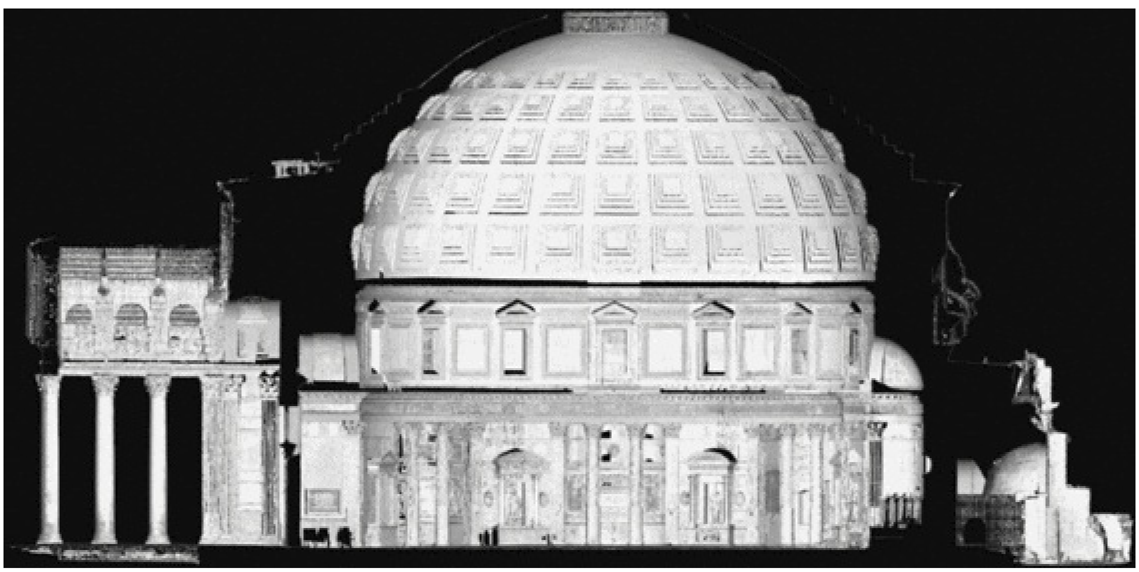
These known examples can be compared with the few indications we have in the written sources. Vitruvius gives no rules for determining the depth of foundations except that for temples they should be proportionate to the size of the work, and should extend "into the solid" (*de arch.* 3.4.1). Palladius (1.8.2), writing in the fourth century in relation to villas, recommends that foundations in solid clay need to be one-fifth to one-sixth of the total height of the building, while those in loose earth need to be dug until solid clay is found, or to a total height of one-quarter of the building. The early medieval *Mappae Claviculae*, generally argued to be based on earlier Roman building practice, recommends that the depth of foundations for vaulted structures should equal the height of the walls to the springing of the vault.[15] The obelisk of Augustus's solarium north of the Pantheon in the Campus Martius was reputed to have had foundations equal to its height of 22 meters (Pliny, *Naturalis Historia* 36.72–73); while this figure cannot be taken as entirely reliable, it does suggest that the foundations were considerable. These figures suggest a possible range for the depth of foundations from 7 to 9 meters up to 22 meters. Given how limited the excavations of the rotunda foundations have been, it is in fact quite likely that they were much deeper than the 4.5 meters generally presumed.[16]

For the purpose of this exercise, it will be assumed that the depth of the foundation below the podium is 7 meters, the minimum of the range suggested by these sources, which is also in keeping with figures for the Flavian Amphitheatre and the Baths of Caracalla, and no allowance will be made

for labor saved by reusing earlier structures. This will give a very rough estimate only, but might at least provide an order of magnitude. The figures that can be calculated for the foundations are for digging and filling those of the rotunda, the intermediate block, and the grottoni, constructing the external brick face of the podium, and creating the new foundations for the inner columns of the portico.

Calculating the Manpower: Assumptions, Approximations, and Limitations

The estimates of manpower given here are based on a volumetric analysis of the main parts of the structure, derived from the dimensions given by Licht, where necessary scaled from plans and sections he supplies,[17] while taking into account the factors outlined in the previous section. Supplementary information derives from the recent laser survey conducted by the Karman Center in Bern (Fig. 6.6). In order to avoid excessively complicated calculations (e.g., in relation to precise forms of arches), an idealized geometry has been employed, mainly in the assumptions that all curves are parts of circles, spheres or cones.[18] Based on experience from calculations for the Baths of Caracalla, small openings (2 meters wide or less) have been ignored, as the work required to form them in thick walls roughly equates to work saved. This should allow quantities of materials to be calculated to a reasonable degree of accuracy.



6.6. Laser scan of longitudinal section. (Karman Center, Bern, BDPP0021)

Nevertheless, several other assumptions, approximations, and limitations have to be made to arrive at manpower estimates, relating both to the fabric of the building and to the conditions of labor. As we have seen, some elements of the foundations, the roofing of the portico, and the centering for the dome structure have had to be excluded, or only a very rough estimate given, because there are simply too many unknowns. Also excluded from the calculations are most preliminary groundworks; the preparation of materials away from the site, including quarrying, lime burning, and brick production; the transport of materials to the site and the removal of construction debris; and any waste of materials, which might have added upward of 10 percent in terms of mortar alone. Minor elements of the main fabric, for example the brick and travertine external cornices, have also been excluded.

Apart from the labor required for shaping and setting up of the columnar orders of the rotunda and the portico, which is an essential part of the construction process, decoration and finishing will be discussed only very briefly. On the other hand, aspects of the construction process that are not immediately obvious in the finished fabric often require large amounts of labor and have been included, such as processing materials on site, moving building materials horizontally and vertically to where they are required to be put in place, erecting scaffolding, and formwork. Also taken into account is supervision at rates of 1:10 for most construction, and 1:4 or 5 for complex actions such as raising and setting in place the architectural orders or erecting large formwork.

Other assumptions affect the operation of the building site and have direct implications for labor requirements. Once the building materials have arrived on site, they need to be stored until needed, with some elements requiring further processing, such as lime slaking and mortar mixing. The most likely areas for this are in the open space to the north, which later became the Pantheon precinct, and the area of the Saepta Iulia alongside the Pantheon to the east, which, according to the evidence of brickstamps, was rebuilt immediately after the Pantheon.[19] The internal area of the rotunda may also have been used in the early stages of construction. The availability of such large spaces in the immediate vicinity suggests that horizontal movement of materials on site could be reduced to a minimum, and an average figure of 50 meters is assumed in the calculations. Finally, it is assumed that no extra work was necessary for the furnishing of the construction infrastructure – the cranes, pulleys, ropes, scaffolding, and baskets essential to the construction process – as all of this, including special large cranes and equipment needed for moving and putting in place large architectural elements and formwork, would presumably have been available either in imperial stores or with imperial contractors involved with previous large-scale building works, such as the Baths of Trajan and the Forum of Trajan completed in AD 109 and AD 112/113, respectively.[20] Even much of the timber for the formwork should have been readily available from the same sources, although some extra work would be necessary to adapt this to current needs.

The manpower constants needed to convert volumes of materials into the amount of labor required for construction are derived from historic figures for labor output in the building trades, in particular data from nineteenth-century Italy where traditional methods of construction and building materials comparable to those of the Roman period were still in use.[21] The particular figures and formulae used have been chosen to match as closely as possible the process of construction and specific working conditions that can be identified from traces left in the fabric of the Pantheon, or, where this is not possible, from more general observations of contemporary Roman construction in brick-faced concrete. From the consistency of rates for laying bricks from different periods and/or places, for example, it is reasonable to assume that this would have been very similar in the Roman period when similar tools were used, suggesting a figure of 500 bricks per day for a mason, for actually laying the face of the Pantheon, with an assistant to supply the bricks and mortar.[22]

A number of assumptions have had to be made about how these relate to ancient working practices, but these are all slanted toward providing minimum figures for labor, on the understanding that the actual figures are likely to have been higher.[23] The specific assumptions used here concerning working conditions are those used for the labor estimates relating to the Baths of Caracalla. The historical labor constants are given for an hour’s work, over a day of 10 working hours (12 hours including breaks), and it is assumed that the ancient working day was the same. All labor here has been treated as the same, although it would be possible at a later stage of analysis to divide it into

unskilled and a variety of skilled trades (e.g., masons, carpenters, marble workers).

Since it is not possible to make accurate allowance for all of the uncertainties inherent in the exercise, these calculations provide only approximate and hypothetical figures, which serve as a guide to the scale of operations rather than any kind of precise values for the actual situation in antiquity.[24] In addition, the figures as calculated are generally minimum possible figures, while the exigencies normal to building operations in all periods strongly suggest that actual figures would have been higher.

Since the building divides neatly into four virtually separate elements, it is simplest to present the raw manpower figures as four tables, each divided into the relevant number of construction phases or processes.

Altogether, the calculations suggest that a minimum of about 400,000 (399,000) mandays were required for the main phases of construction of the Pantheon, comprising 340,000 mandays of general construction labor (rotunda 272,900; intermediate block 30,400; porch 7,300; grottoni 26,000) plus about 60,000 mandays for shaping the architectural elements (see Tables 6.1, 6.2, 6.3, and 6.4). A more useful way of expressing this data in order to assess the historical significance of a building project is as a number of men working over a given time: the figures given here for the Pantheon are the equivalent of 1,100 men working every day for a year, or 110 men for 10 years. If, however, we take into account the likely actual sequence of construction along with attendant practical considerations, it should be possible to estimate more precisely the minimum size of the workforce and the shortest possible period over which it was required.

Table 6.1. ***Manpower for building the rotunda in mandays (mdays) of labor***

Rotunda		**Foundations**	**Lower zone**	**Middle zone**	**Upper zone**	**Dome**	**Total**
Quantities							
Total volume (m^3)		**9,490**	**7,050**	**6,710**	**8,070**	**5,180**	**36,50**
Brick pieces in facing		**24,000**	**365,000**	**178,000**	**136,000**	**178,000**	**881,0**
Actions	**Rate**	**Total mdays**	**Total mdays**	**Total mdays**	**Total mdays**	**Total mdays**	**Total mday**
Excavate in rocky ground to	0.165 mdays/m^3	320					320

1.6 m[a]							
Excavate 1.6 m	0.248 mdays/m³	782					782
Remove debris over 50 m[b]	0.164 mdays/m³	1240					1,240
Slake lime for mortar[c]	1.2 mdays/m³	771	535	426	586	437	2,760
Mix mortar[d]	0.55 mdays/m³	1,950	1,290	1,310	1,860	1,340	7,750
Fetch materials	0.164 mdays/m³	1,560	1,160	1,100	1,320	850	5,990
Lay foundations[e]	0.384 mandays/m³	5,350					5,350
Lay face[f]	800 (1,000*) pieces/day x 1.5 for assistant	36*	684	332	254		1310
Lay core[g]	4.01 + 0.12 (ht – 1) mdays/m³ x 1.5 for assistant	8,440	40,300	38,400	67,500		154,5
Lay core for dome	2.68 + 0.08 (ht – 1) mdays/m³ x 1.5 for assistant					53,500	53,50
Lay arches and bonding courses[h]	200 bricks/day x 1.5 for assistant		240	1,010	591	67	1,910
Raising	0.12		700	3,410	3,100	1,350	8,560

materials[i]	mdays/m³ x (ht – 1)						
Erect scaffolding[j]	0.063 mdays/m² face		334	206	334	300	1,170
Formwork for vaults[k]	0.2 (0.4*) mdays/m²		27	470	799	1,740*	3,040
Subtotal		20,500	45,300	46,700	76,300	59,600	248,0
Supervision	10% of total	2,050	4,530	4,670	7,630	5,960	24,80
Shaping orders			16,900	2,470			19,40
Moving and lifting orders[l]			1,480	756			2,240
TOTAL		**22,500**	**68,200**	**54,600**	**84,000**	**65,600**	**295,0**

a Pegoretti 1869, vol. 1, pp. 240–245, for the whole process of digging foundations.

b Pegoretti 1869, vol. 1, p. 157.

c Pegoretti 1869, vol. 2, p. 131.

d Pegoretti 1869, vol. 2, p. 144.

e Pegoretti 1869, vol. 2, p. 144.

f DeLaine 1997, no. 3, pp. 268–269, note 5. The higher figure indicated by an asterisk is for the rougher brickwork in the substructures.

g Pegoretti 1869, vol. 2, pp. 144–145.

h Pegoretti 1869, vol. 2, p. 156, and DeLaine 1997, no. 3, p. 176.

i Pegoretti 1869, vol. 1, p. 243.

j Pegoretti 1869, vol. 2, pp. 6–7, for all details of scaffolding.

k Pegoretti 1869, vol. 2, p. 209, for all details of vault centering. The higher figure is for the more complex vaults.

l Pegoretti 1869, vol. 2, pp. 14–15.

Table 6.2. ***Manpower for building the intermediate block in mandays (mdays) of labor***

Intermediate block		Foundations	Lower zone	Middle zone	Upper zone	Total
Quantities						
Total volume (m^3)		933	1,340	1,175	509	4,000
Brick pieces in facing		3,420	64,300	52,600	57,000	177,000
Actions	**Rate mdays/m^3**	**Total mdays**	**Total mdays**	**Total mdays**	**Total mdays**	**Total mdays**
Excavate in rocky ground to 1.6 m	0.165 mdays/m^3	37				37
Excavate below 1.6 m	0.248 mdays/m^3	175				175
Remove debris over 50 m	0.164 mdays/m^3	153				153
Slake lime for mortar	1.2 mdays/m^3	99	104	143	67	412

Mix mortar	0.55 mdays/m³	249	250	439	206	1,140
Fetch materials	0.164 mdays/m³	199	220	748	352	1,520
Lay foundations	0.384 mdays/m³	196				358
Lay face	800 pieces/day x 1.5 for assistant	5	121	177	29	332
Lay core	4.01 + 0.12 (ht – 1) mdays/m³ x 1.5 for assistant	1,240	7,810	9,040	4,260	22,400
Lay arches and bonding courses	200 bricks/day x 1.5 for assistant		34	20	30	84
Raising materials	0.12 mdays/m³ x (ht – 1)		114	487	229	830
Erect scaffolding	0.063 mdays/m² of face		59	50	54	163
Formwork for vaults	0.2 mdays/m²		11	28	27	66
Subtotal		2,520	8,720	11,100	5,250	27,600
Supervision	10% of total	250	870	1,110	525	2,760
TOTAL		**2,770**	**9,590**	**12,200**	**5,780**	**30,400**

Table 6.3. ***Manpower for building the portico in mandays (mdays) of labor***

Portico		**Foundations**	**Columns**	**Entablature**	**Pediment**	**Roof**

Action	Rate	Total mdays	Total mdays	Total mdays	Total mdays	Total mdays
Excavate in rocky ground to 1.6 m	0.165 mdays/m³	38				
Excavate below 1.6 m	0.248 mdays/m³	180				
Remove debris over 50 m	0.164 mdays/m³	157				
Slake lime for mortar	1.2 mdays/m³	78				
Mix mortar	0.55 mdays/m³	198				
Fetch materials	0.164 mdays/m³	157				3
Lay foundations	0.384 mdays/m³	368				
Tie up blocks with ropes[a]	0.03/0.033 mdays/m³ x 5 men		88	52	56	32
Place on rollers	0.025/0.0275 mdays/m³ x 5 men		73	43	47	24
Move large items 50 m	0.003days/m x 50 m x (5 + (wt – 5t)/1.25) men		207	125	128	203
Raise and put in place	0.025 days/m x ht x (11 + wt/0.625)		627	889	1,020	1,590

	men					
Lay roof	0.22 mdays/m³ + 1.625 mdays/m²					759
Subtotal		1,180	995	1,110	1,250	2,610
Supervision	10% of total	118	included	included	included	included
Shape stone and marble elements			33,600	4,940	1,620	
TOTAL		**1,300**	**34,600**	**6,050**	**2,870**	**2,610**

a Pegoretti 1869, vol. 2, pp. 14–15, for this and all other formulae for moving and raising large blocks.

Table 6.4. *Manpower for building the grottoni in mandays (mdays) of labor*

Grottoni		Foundations	Lower zone	Middle zone	Upper zone	Total
Quantities						
Total volume (m³)		1,070	1,330	1,260	526	4,190
Number of brick pieces in facing			91,200	89,000	57,000	237,000
Action	**Rate mdays/m³**	**Total mdays**	**Total mdays**	**Total mdays**	**Total mdays**	**Total mdays**
Excavate in rocky ground to 1.6 m	0.165 mdays/m³	43				43
Excavate below 1.6 m	0.248 mdays/m³	202				202

Remove debris over 50 m	0.164 mdays/m³	176				176
Slake lime for mortar	1.2 mdays/m³	87	105	98	28	318
Mix mortar	0.55 mdays/m³	222	319	304	89	934
Fetch materials	0.164 mdays/m³	176	218	202	86	682
Lay foundations	0.384 mdays/m³	412				412
Lay face	800 pieces/day x 1.5 for assistant		171	168	15	354
Lay core[a]	4.03 + 0.12 (ht – 1) mdays/m³ x 1.5 for assistant		7,870	8,400	3,260	19,530
Lay arches and bonding courses	200 bricks/day x 1.5 for assistant		45	15	98	158
Raising materials	0.12 mdays/m³ x (ht–1)		73	175	123	371
Erect scaffolding	0.063 mdays/m² of face		93	84	20	197
Formwork for vaults	0.2 mdays/m² of face		106	98	54	219
Subtotal		1,320	9,000	9,540	3,770	23,600
Supervision	10% of total	132	900	954	377	2,360
TOTAL		**1,450**	**9,900**	**10,500**	**4,150**	**26,000**

[a] Pegoretti 1869, vol. 2, pp. 144–145. The figure is slightly higher than for the rotunda because of the relative thinness of the walls.

Scheduling the Work

Construction on the whole is a logical process, where the sequence of events is largely determined by structural necessity, the inexorable demands of gravity, and the behavior of materials. Within these limits, however, there are usually several different ways in which the work can be scheduled, especially in complex projects like the Pantheon with its four potentially independent units. In addition, certain construction processes require the cessation of work for a period of time. As concrete gains strength only over time, it is not possible that the whole of the fabric of the rotunda could have gone up in a single season. The builders would have wanted to be sure that the strength of the concrete was sufficiently developed before laying the drum on the foundations, and before erecting the dome on the drum, making these obvious places for a fairly lengthy cessation of work. Additional stages are also highly likely, as argued later.

The first steps in construction are obviously the groundworks and foundations. The archaeological and constructional evidence suggests that all of the foundations of the rotunda, intermediate block, and portico were created at the same time, but that those of the grottoni, which abut those of the rotunda, were added partway through construction.[25]

While the sequence of construction for the rotunda itself is reasonably self-evident, a few points need to be made here. The first is that the three divisions, coinciding with the three exterior cornices, would appear to mark natural breaks in construction (Fig. 6.3). On the interior, the lowest corresponds with the top of the frieze of the main order. The insertion of the lower columnar order would have necessitated a hiatus in the construction of the drum, since the order is an integral part of the structure and both architrave/frieze and cornice blocks are embedded in its concrete walls. For these heavy marble blocks to be supported by the concrete, the drum probably needed to have gained more strength than ordinarily required to support the next lift of concrete, although exactly how long this would have taken cannot be determined.[26] The same applies to the cornice blocks of the interior attic zone, which project strongly and thus need to be deeply embedded in the walls. Although the upper zone of the drum on the inside forms the lower part of the dome, this part is almost vertical and could easily have been built by gently cantilevering out each lift of concrete (see Chapters Four and Seven). The need for the whole drum and lower part of the dome to gain most of its strength before the upper part of the dome was added introduces another necessary hiatus in construction.

The situation is more complicated with the other three elements of the building, as, for example, the lower walls of the grottoni and the upper walls of the intermediate block abut the rotunda and must have been built later than it. Although the intermediate block was clearly planned as an integral part of the Pantheon, it is only bonded to the rotunda up to roughly the level of the first exterior cornice, so that the rest cannot have been completed until after the drum was finished.[27] Since there are no structural reasons for the intermediate block not to be bonded to the rotunda, it is reasonable to assume that there was a gap of a season or more. Exactly how long after the rotunda was finished is impossible to determine, but the similarities in the brickstamps make it clear that not much time elapsed. The inverse situation prevails for the grottoni, where the structure seems not to have been

part of the original plan, but was added partway through the construction of the rotunda, perhaps for structural reasons.[28] Here, only the bridge is bonded to the rotunda, so that the lower and middle parts of the structure must have arisen only after the corresponding levels of the drum had already been completed. Again, the three levels of the grottoni do not necessarily represent different building phases. The final section to be built was the portico, which is independent of the rotunda and cannot be any earlier than the upper levels of the intermediate block, which are essential prerequisites for its construction. Current arguments for a change in design affecting the portico also assume that this was added last.[29]

Practical constraints also affect the size of the workforce and the time taken for construction, the kind of logistical considerations that are still an essential part of modern building practice. The construction period is limited by the length of the building season and the number of days when no building work is taking place. A recently discovered series of grafitti from the near-contemporary Baths of Trajan has provided a unique window on the actual working conditions prevailing on major imperial building sites in Rome.[30] The sequence of dates painted roughly on the walls of the structure as it rose suggest that there were no rest days, and that the builders worked from at least late February to October. If we apply this work schedule, but allow for the constraints on construction due to adverse weather conditions in the winter months, then we can assume a construction season of 270 days over 9 months for outdoor work, with indoor work (some materials preparation, interior decoration) continuing over a 12-month season of 365 working days maximum.

The main logistical constraint on the speed of construction is the maximum number of men that can be assigned to any given task. The most important of these is the maximum number of masons that can be employed simultaneously along any given stretch of wall or foundation, which is largely determined by the physical geometry of the structure. While the Renaissance architect Filarete recommended a minimum spacing of masons of 1.85 meters, the average span of an adult male, the pattern of the grafitti from the complex semicircular exhedra of the Baths of Trajan implies a spacing of 3.5 meters, roughly twice that;[31] given the much larger diameter and the fewer reentrant elements such as niches in the Pantheon, for this exercise a slightly closer spacing of 3 meters will be assumed. It would therefore not be feasible to fit more than about 100 masons working on the brick facings and core at the same time on any level of the rotunda, which suggests a minimum time for each of the first three levels of about 260 days; the external cornices of the rotunda therefore might each have represented the end of a single building season.[32] In comparison, no stage of the intermediate block or the grottoni would need anything more than half a season; indeed, it would be theoretically possible to have built the middle or upper zone of the intermediate block, or the lower or middle zone of the grottoni, in less than 100 days each. The shortest possible theoretical schedule for the Pantheon would, therefore, be six years, assigning a year each to the site works, foundations and substructures; the lower zone of the rotunda and intermediate block; the middle zone of the rotunda and the foundations of the grottoni; the upper zone of the rotunda and all of the grottoni; the completion of the dome, the rest of the intermediate block and the portico; and the decoration. As Lise Hetland's redating of the Pantheon based on the brickstamps[33] provides a starting date of AD 112–114, this six-year schedule would suggest a possible completion date of AD 117–119.

The presence of dated brickstamps in the fabric of the Pantheon, however, enables us to refine this schedule and makes such an early completion date unlikely. The catalogue published by Bloch provides sufficient information to locate about 50 stamps with a reasonable degree of certainty.[34] The

stamped bricks are not distributed uniformly, but it is significant that stamps of Rutilius Lupus with secure consular dates of AD 114 and 115 occur in the middle zone of the rotunda, and those of AD 117 in the upper level of the grottoni, built together with the upper zone of the rotunda. This makes it certain that the dome itself must have been completed under Hadrian, but the total absence of clearly Hadrianic brickstamps, particularly those of AD 123, in the whole of the main fabric, including the dome and the upper part of the intermediate block, excludes a predominantly Hadrianic structure, as Hetland has also noted. On the other hand, studies of late Trajanic and Hadrianic structures at Ostia suggest that the majority of bricks tended to be used relatively soon after they were produced,[35] so that it is reasonable to assume that work on the Pantheon had indeed begun by AD 114, rather than that these stamped bricks represent old stock. Assuming that the work could not begin before 112, and more likely 113, and allowing also for the construction pattern of the grottoni, which might have required a hiatus before work started on the upper zone of rotunda (see the section "Years 3–5: Completing the Rotunda and the Grottoni"), a minimum construction schedule over seven years, plus two for decoration, ending in AD 122, would be feasible. This proposed schedule could equally be spread over more years if there were any unforeseen breaks in construction, for example due to structural problems or delays in the supply of materials,[36] but the absence of stamps of AD 123, except for one possible example behind the decoration in the porch, does not allow the schedule to be extended beyond a couple of years, finishing with the decoration in AD 123 or 125. This schedule provides a strong working hypothesis that can be used to assess the size of the workforce.

The Size of the Workforce

Calculating the size of the required workforce involves further assumptions, and can only produce average minimum figures. It is assumed that all of the labor works at full capacity for the whole of 10 hours per day, and that the required workforce is always available – neither being very likely if modern practice is any guide. It is also assumed that Roman contractors avoided extreme peaks in labor demands as far as possible, as happens in modern construction projects where they are considered weak points in the scheduling. This would have been particularly important where skilled workmen were concerned, for example, the marble workers preparing the stone for the orders. Such calculations and considerations are of course hypothetical, and many other schedules are possible, but the exercise at least allows us to establish some realistic minimum parameters for the work. The suggested figures are given in Table 6.5.

Table 6.5. ***Number of men required for a 9-year construction schedule***

Year	Days	Portico	Intermediate block	Rotunda	Grottoni	Total
1	135	Groundworks				?
	135	Foundations 10	Foundations 20	Foundations 170		200

2	340			Prepare orders 60		60
	255		Lower level 40	Lower zone 190		230
	15			Erect orders 100		100
3	40			Prepare cornice 60		60
	80			Middle zone 230		230
	20				Foundations 70	70
	170				Lower and middle levels 135	135
4	160			Middle zone 230	Start bridge 10	240
	15			Erect cornice 50		50
	95			Start upper zone 230	Continue bridge 10	240
5	340	Prepare stone 60				60
	270			Complete upper zone 230	Complete bridge 10	240
6	340	Prepare stone 60				60
	270		Middle level 40	Dome to coffers 200		240
7	120		Upper level 50	Complete dome 90		140

	130	Erect 50			50
8–9		Finish decoration	Finish decoration	Finish decoration	?

Year 1: Foundations and Site Preparation

If we assume that the making of the foundations for the portico, rotunda, and intermediate block occupied all of the first season of 270 days, only a relatively small number of men – roughly 100 – would have been required. The shortest possible time, determined by the maximum number of men who could work on the rotunda foundations at any time, would be about 90 days, needing 300 men each day. Neither of these figures, however, takes into account any of the preparatory groundworks, which could have occupied, say, half of the first season. In Table 6.5 it has, therefore, been assumed that the digging and laying of the foundations occupied only the second half of the season, that is, 135 days, requiring an average workforce of about 200 men each day, who might have spent the same sort of time in the preliminary groundworks.

At the same time, we need to allow for a break between laying the foundations proper and erecting the substructures above them, which could have been as much as several months while the concrete completed curing and gained strength. Although it may be that the proposed three months between the construction seasons would have been sufficient, we need to bear in mind that since the domed rotunda was pushing Roman construction technology to its limits, a longer period may have been considered necessary. Site preparation, for example, could have been carried out in one year and the foundations laid at the beginning of the next season. Some work could have progressed in the meantime, for example, lime slaking, which preferably had to be done at least three months ahead of the time needed,[37] andthis period might also have seen the accumulation of materials in on-site depots ready for the major construction phases. Of course, the uncertainties over the details and extent of the foundations just discussed mean that the labor requirements given here are likely to be lower than they were in practice, just as the time period could easily have been longer. This all makes an actual starting date of the main part of the structure before AD 114 highly unlikely.

Year 2: The Lower Zones of the Rotunda and the Intermediate Block

The second year of the proposed schedule is probably the most secure, with the rotunda and intermediate block rising together. In this year it is also necessary to take into account the time required for erecting the columns and entablatures of the main interior order at the end of the season. As the entablature blocks over the columns of the recesses were embedded into the concrete walls of the drum on either side and supported in the center on the paired columns, the subsequent sequence of construction meant that they could not have been inserted later. The absolute minimum possible time for this, given that the elements have to be erected in sequence – base, column shaft, capital, architrave, frieze, and cornice – is about five days. If all were erected together this would require 14 teams of at least 11 skilled stoneworkers, each team with its own crane, plus a large number of men to provide the motive power for each (up to 40 in the case of the columns shafts). Given that the

columns in each pair are quite closely spaced, however, one team for every pair of columns gives a more likely maximum number of teams, although only three or four would be feasible concurrently. If we leave, say, 15 days at the end of the 270-day season for this process, then there are only 255 days for erecting the masonry of the lower zone, needing just over 190 men (Table 6.5), approximately the same number as suggested for the foundations. The building of the lower zone of the intermediate block adds another 40 men, while 80 stone carvers would have been needed over the same period for preparing the architectural elements, if indeed this was done on site or nearby.[38] It is also possible that work had started on these elements during the previous year, and a period of 340 days requiring on average 60 stone carvers is suggested here. Much would have depended on the availability of the large blocks needed, especially the column shafts, and this is therefore one of the more difficult elements for which to estimate the numbers of craftsmen required.

Years 3–5: Completing the Rotunda and the Grottoni

As the manpower requirements for the middle zone of the rotunda are very similar to those of the lower zone, requiring 215 men on average if spread over 255 days, in theory this could also have been completed in a year. A short period of 15 days has again been taken out of the 270-day season at the end of this construction phase to raise and put in place the interior cornice blocks, a simpler operation than installing the interior order but similarly requiring the blocks to be embedded in the concrete; using the same equipment this would have needed roughly 50 men. Preparing the blocks for this cornice could have been done by just 7 men over 365 days, or 60 men over 40 days if the team that had worked on the interior orders was used.

The building of the grottoni, however, adds a level of complexity to the scheduling, which is open to several possible solutions. While the foundations of the grottoni could have been dug and filled in as little as 20 days with 70 men, there is an upper limit of 135 men based on a 3 meter spacing of bricklayers at the face for each of the lower and middle ranges. This gives a minimum construction time of roughly 85 days for each of the two levels. Scheduling for this depends on the point at which the decision to add the grottoni arose. They are independent of the rotunda until about one-third of the way up the middle zone, and so one schedule might see the foundations of the grottoni begun at the start of the season, then being left to gain strength for, say, 80 days, while work continued on the middle zone of the rotunda, and then resume with the lower range of the grottoni, continuing without interruption with the middle range, and finishing after 190 days at the end of the season while the internal cornice was being added to the interior of the rotunda. In this schedule, the building of the grottoni is designed to operate in tandem with that of the rotunda, gradually catching up to end just behind it. This would produce the physical abutting of the grottoni that can be observed in the structure. It would mean, however, that the necessary workforce would have to have been more than half as large again as required for the lower zone of the rotunda, some 330 men.

If we accept, however, that the grottoni were an attempt to redress a perceived structural weakness in the drum,[39] then it is likely that an extra year needs adding to the schedule. In this reconstruction, the fault would have manifested itself early in the third year of construction while the middle zone of the rotunda was being built. Work on the rotunda would have been suspended for at least 190 days, to build the foundations and then the first two levels of the grottoni, requiring only 135 men.

Work could have recommenced on the middle zone of the rotunda and the final level of the grottoni

(the bridge) in the fourth season, requiring 240 men altogether over 160 days, plus 15 days for the interior cornice to be put in place. The scheduling at this stage is further complicated by the fact that manpower requirements increase and speed of construction decreases with height, because of the extra time and effort needed to get materials to their required positions, to erect scaffolding, and for the men themselves to move around the building. While it may appear natural to have waited until the following season to start building the upper zone of the rotunda, it would have been difficult to complete this section in a single season without greatly increasing the workforce. Even allowing for starting within the extra 95 days left at the end of the fourth season of construction, an average of 240 men would have been needed to complete the upper zone of the rotunda and grottoni in the 270 days of the fifth season. This would have given three months for the drum of the rotunda to gain strength before erecting the main part of the dome in the sixth season.

Years 6–7: The Upper Dome, Intermediate Block, and Portico

Rather different concerns affect the scheduling in the final stages of the work, in particular the sequence in which the building operations are carried out. One difficulty is that, unlike the walls of the drum where there would have been masons working at both internal and external faces, the upper part of the dome could only be laid from the external face, as there was a solid centering behind the internal face. This means, therefore, that only half the number of masons could have worked on the dome at any time compared with the number who worked on the drum. This problem is compounded by the fact that the length of the workface also decreases as the dome rises, so that while 58 masons could have worked at the outer face at the base of the upper dome, only 9 could have worked at the oculus with the assumed spacing of 3 meters. Work therefore necessarily slows down considerably as the dome enters its final stages, with the result that it is very unlikely to have been completed in a single season of 270 days, and a minimum period of 345 days would be a better estimate; about a third of that period would have been needed just for the final section above the coffers. A schedule that saw the dome built up to the end of the coffering in the sixth season would have required roughly 200 men, with 90 working on the final section in the first 120 days of the next season.

Such a schedule has some advantages. The lower two-thirds of the dome is both more vertical and, particularly with its stepped extrados, better able to contain any horizontal elements of thrust. By allowing it to gain strength over the winter, it would have become self-supporting, potentially allowing for the complex formwork and heavy scaffolding required for building the coffers to be removed before the crown was added. The lower dome would then have been much more effective in supporting the crown, constructionally the most difficult part of the operation due to its increasing horizontality, and structurally the part most at risk of failure for just the same reason. The relatively small and lightweight crown in turn could have been decentered toward the end of the seventh season. Removing the formwork for the dome in two stages in this way may have been easier than decentering such a vast span in a single action.

This still leaves the completion of the intermediate block, and here there are several possible solutions. The upper level could employ no more than 50 masons over a minimum period of 57 days, with an overall workforce of about 100 men. The solution suggested here is to build the middle level of the intermediate block with the lower part of the dome, using 40 men over the whole season. As the completion of the intermediate block is an essential prerequisite for the construction of the portico, the latest it could be completed, assuming the portico was begun in the seventh year, would have been

at the same time as the crown of the dome was being built, with its much reduced workforce. Spread over the 120 days needed for finishing the dome, the final section of the intermediate block would have required only about 50 men.

Considerations of logistics are even more important when we examine the erection of the portico. Here it would be theoretically possible to put the whole of the portico colonnade in place in 9 days, with 230 men divided into 16 teams, raising each column and entablature sequence simultaneously. Given the relatively restricted amount of space available around each column, especially the internal ones, this is unlikely, and there would be additional problems in raising the roof trusses once all of the colonnade was in place. A more logical scheme would be to start erecting the colonnade from the rear against the intermediate block, putting in place first the marble piers and then the inner row of columns, followed by the corresponding entablatures and finally the first and second roof trusses over the piers and the columns. Work would then progress outward toward the facade, so that once the pediment was in place, the main supporting structure of the roof was already complete, and the actual roof timbers and marble tiles could be put in place. Even this would make it awkward to maneuver the larger blocks, especially the column shafts and architraves that needed two cranes, into place, particularly for the inner columns. Here it is assumed that only two columns or entablatures were erected at the same time, starting with the inner pair and moving outward. Similar considerations apply to the blocks of the pediment and its cornice. The columns and entablatures would then take a minimum of about 50 days, allowing for the cranes to be moved, with a further 0.5 day for each truss, and 11 days minimum for the pediment. The roof adds a further minimum of 30 days. If the same crew of 50 men were used throughout, the whole could be done in about 130 days, although more men would be needed at specific times to raise the largest blocks. Before this, all of the stonework (columns, entablatures, and roof tiles) would have needed to be prepared, which could have been done over two years of 340 days by the same 60 workmen who prepared the internal orders.

Years 8–9: Decorating and Finishing

The final years of the schedule are required for finishing the detail of the architectural orders and for surface decoration. Calculating these would be another exercise entirely, but finishing the interior order of the rotunda, and the order and main stonework of the portico, require roughly 25,000 mandays each. For the portico, considerations of the logistics of working suggest that it might have needed two years with a team of some 50–60 marble workers, so that if we also take into consideration the construction and finishing of the internal aedicules as well as the surface decoration, a two- to three-year decorative program seems the most likely.

The relative schedule presented here can be given possible minimum absolute dates. As argued previously, a start date before AD 114 is unlikely, and is consistent with the stamps from the middle and upper zones of the rotunda. If we allow that bricks began to be used very shortly after they were made, the presence of bricks of AD 115 in the middle zone of the rotunda means that it should have been under construction by 116 at the latest, while those of 117 in the grottoni bridge would also work with this schedule. Completion of the decoration would not therefore be possible before 122, and if Lanciani’s report of a fragmentary stamp from behind the decoration of the portico pilasters is correct,[40] the finishing and decoration phase may have either continued, or the actual construction been extended, for an extra year or so. The precise dating within these narrow parameters is unrecoverable, and to some extent immaterial for the arguments of this chapter. The key point is that

the scheduling suggests the minimum overall time required for completion, and the minimum average number of workers required for that schedule. A longer schedule would only reduce the average number of workers required.

The Pantheon in Context

The results presented here represent only one possible schedule, relating only to part, albeit the main part, of the labor needed for the erection of the Pantheon. To these should be added the work necessary to produce and transport the building materials, which may have increased the workforce by about one-fifth if the Baths of Caracalla are any guide, and all of the small elements such as the exterior brick and travertine cornices that had been omitted for simplification, plus such imponderables as the dome centering. Nevertheless, the figures are remarkably modest for a structure that looms so large in the history of Roman architecture. Even for the suggested nine-year schedule, in most years the minimum workforce engaged in actual construction would not have needed to be more than 240 men, a relatively modest figure compared with a minimum of 4,000 men required for building the central block of the Baths of Caracalla, one of the largest construction projects ever undertaken in Rome, with the possible exception of the aqueducts.[41] It should be remembered, for comparison, that the Baths of Trajan, completed perhaps only five to six years before the Pantheon was started, would have required a workforce of similar size to that of the Baths of Caracalla. Even if we increase the workforce for the Pantheon by, say, 20 percent to allow for waste and for men working at less than their full capacity, the numbers are still quite small.

But the Pantheon was not a stand-alone structure (Plate III). In front of it was a porticoed precinct that would have required further manpower for construction, but not necessarily more at any one time, as it must have been built largely after the Pantheon itself was finished, having most likely acted as a works yard for the Pantheon build. The Basilica of Neptune, on the other hand, was constructed at the same time as the Pantheon and physically linked by the grottoni bridge, so that the total numbers of men working at any one time may have been up to a third again as were required for the Pantheon, making a minimum of 300 men in round figures for the two structures. This workforce might then have gone on to work on other buildings in the Campus Martius, particularly the rebuilding of the Saepta and the Baths of Agrippa in the 120s which apparently formed part of the same project of restoration after the fire in AD 110.[42] The impact on Rome's working population could, of course, have been spread wider than this group, as most of the workforce were general laborers and, hence, likely to have been hired only for the short term from a large pool. Nevertheless, the total impact would have been small compared with most of Trajan's other building projects.

The Pantheon would have had different connotations for Trajan and for Hadrian as part of a fairly extensive restoration project following a major fire. All of the buildings involved were closely associated with Agrippa and thus with Augustus, so that their restoration befitted the emperor who bore the title of *optimus* and was often spoken of in the same breath as Augustus, following Augustus's own practice (*Res Gestae* 20.1) and a long tradition of restoration of public monuments going back into the Republic, with the buildings retaining their original names. Only the completion of the project under Hadrian caused it to be associated with him rather than with Trajan. Hadrian's own temple building projects, the Temple of Deified Trajan and the Temple of Venus and Roma, arguably would have been far more important for him politically than the Pantheon. The Temple of Deified

Trajan, the only one that, according to the sources, Hadrian put his own name on, was a key tool in helping legitimize his succession, and it seems to have used a 60-Roman-foot order, comparable to that of the Temple of Mars Ultor. If we accept Amanda Claridge's new reconstruction of the temple as hexastyle,[43] it would have needed 12 giant gray granite shafts, fewer than the 16 exterior columns of the Pantheon porch, which, as Davies, Hemsoll, and Wilson Jones have argued, were originally designed to be of this size.[44] One could therefore suggest that Hadrian, rather than privileging the Pantheon as the epitome of Roman temple construction, commandeered the columns that Trajan had intended for the Pantheon for his own temple to his deified predecessor. The Temple of Venus and Roma made an even greater impact on the topography and political life of the city. The temple was connected with the festival of the Parilia, later known as the Romaia, and is commonly called simply "the temple of the city" in Roman sources.[45] Consecrated in AD 121 when the Pantheon was all but complete, and possibly still not finished at the end of Hadrian's reign, this was the largest temple in Imperial Rome, employing 124 columns 60 Roman feet high, more than ten times the number for the Temple of the Deified Trajan. Moreover, it not only occupied a central position between the Roman Forum and the Flavian Amphitheater but also required the drastic moving of the Colossus of Nero to accommodate it. In plan and height the Temple of Venus and Roma had much in common with the Temple of Olympian Zeus in Athens, which Hadrian is said to have completed, and even features on Rome's coinage, unlike the Pantheon. Thus, rather than thinking of the Pantheon as Hadrian's great achievement, we should reserve that accolade for the Temple of Venus and Roma.

Conclusions

These calculations, however hypothetical in some aspects, serve to show that while the Pantheon may have been a triumph of construction, compared with other Trajanic projects including the emperor's great *thermae*, or indeed the Temple of Venus and Roma, it was hardly the mammoth undertaking that many have wished to believe. Its Trajanic context reveals it not so much as the signature building of Hadrian the architect, or even of Hadrian the *princeps*, but as just the last in a series of outstanding and innovative building projects that characterize the reign of his predecessor Trajan.

I am very grateful for the kind assistance of Christina Triantafillou, who worked with me on the basic calculations for the Pantheon, particularly for the *grottoni* and porch, and provided the key data on the Basilica of Neptune, all of which forms part of her unpublished doctoral thesis for the University of Oxford on the economics of Trajan's building projects in Rome.

1 Janet DeLaine, "The *Romanitas* of the Railway Station," *Uses and Abuses of Antiquity*, ed. Michael D. Biddniss and Maria Wyke, Bern 1999, p. 150.

2 See most recently Rabun Taylor, *Roman Builders,* Cambridge 2003, pp. 190–211; Gerd Heene, *Baustelle Pantheon: Plannung, Konstruktion, Logistik*, Düsseldorf 2004, p. 24; Lynne Lancaster, *Concrete Vaulted Construction in Imperial Rome: Innovation in Context*, Cambridge 2005, pp. 43–

46.

3 Janet DeLaine, “The Baths of Caracalla in Rome: A Study in the Design, Construction, an Economics of Large-Scale Building Projects in Imperial Rome,” *Journal of Roman Archaeology*, Supplement 25, 1997, pp. 103–109, 174–194.

4 For example, M. E. Blake, *Roman Construction in Italy from Nerva through the Antonines*, Philadelphia 1973, p. 42.

5 There is in fact no direct dating for the Basilica of Neptune. The 32 brickstamps identified in situ in the grottoni, as listed in Herbert Bloch, “I bolli laterizi e la storia edilizia romana,” *Bullettino della Commissione Archeologica Comunale* 64, 1937–1938, pp. 108–109, nos. 73–104, have often been erroneously attributed in scholarship to the Basilica (Christian Hülsen, “Thermen des Agrippa,” *Römische Gebälke*, ed. F. Toebelmann, Heidelberg 1923, p. 67 n. 3; Lanfranco Cordischi, “Basilica Neptuni in Campo Marzio,” *Bollettino di Archeologia* 5–6, 1990, p. 20 n. 56; Lise Hetland, “Dating the Pantheon,” *Journal of Roman Archaeology* 20, 2007, pp. 95–112; p. 99). The problem has arisen because of uncertainty in the origins and function of the basilica itself as either an independent structure or an element of the Baths of Agrippa, as well as in the relationship of the grottoni to the two structures. The grottoni brickstamps date to the same time as the Pantheon proper, the late Trajanic to early Hadrianic period. As far as can be seen, no brickstamps can be identified solely and specifically with the Basilica itself. However, unprovenanced brickstamps discovered in the general area of the grottoni and basilica all point toward a contemporaneous date for the two structures (see Bloch 1937–1938, pp. 109–112, for the list of brickstamps).

6 E.g., Luca Beltrami, *Il Pantheon: La struttura organica della cupola e del sottostante tamburo, le fondazioni della rotonda, dell’ avancorpo, e del portico, avanzi degli edifici anteriori alle costruzioni adrianee. Relazione delle indagini eseguite dal R. Ministero della Pubblica Istruzione negli anni 1892–93, coi rilievi e disegni dell’ architetto Pier Olinto Armanini*, Milan 1898; Giuseppe Cozzo, *Ingegneria Romana: maestranze romane; strutture preromane, strutture romane, le costruzioni dell’ anfiteatro flavio, del Pantheon, dell’ emissario del Fucino*, Rome 1928, pp. 267–286; Kjeld De Fine Licht, *The Rotunda in Rome: A Study of Hadrian’s Pantheon*, Copenhagen 1968, pp. 63–78, 94–100, 133–142; Blake 1973, n. 4, pp. 42–48; William L. MacDonald, *The Architecture of the Roman Empire*, vol. 1: *An Introductory Study,* London 1965, 2nd ed. rev. New Haven 1982, pp. 94–118.

7 However, in Chapter Five, Gene Waddell argues that once the relieving arches pass into the body of the fabric, they are composed in part of brick, part of concrete. In any case, the overall effect on the manpower figures is relatively small.

8 Licht 1968, pp. 35–58; Louise Rice, “Urbani VIII e il dilemma del portico del Pantheon,”

Bollettino d'arte 143, 2008, pp. 93–110.

9 Licht 1968, pp. 48–56, Figs. 52–63, 72; Rice 2008b.

10 According to Licht (1968, p. 44), several of the blocks of the pediment had been used before, and there are Severan brickstamps from the upper part of the intermediate block facade above the portico (Hetland 2007, n. 5, p. 101; for brickstamps: *Corpus Inscriptionum Latinarum* [CIL], XV 155.2 and 157.1).

11 The exceptional bronze ceiling (or roof) of the caldarium of the Baths of Caracalla makes it clear that the large-scale constructional use of bronze was current in the Severan period; see Janet DeLaine, "The 'cella solaris' of the Baths of Caracalla in Rome: A Reappraisal," *Papers of the British School at Rome* 62, 1987, pp. 147–156.

12 For roof construction in general, see F. C. Giuliani, *L'edilizia nell'antichità*, Rome 1990, pp. 59–68. Details are taken from historical sources: the width of the truss elements are assumed to be equal (James Newlands, *The Carpenter's Assistant: The Complete Practical Course in Carpentry and Joinery*, London 1990, p. 137), and other dimensions for the various timbers used in traditional systems (e.g., purlin, tie-beam, etc.) are from the tables in C. Paola Scavizzi, *Edilizia nei secoli XVII e XVIII a Roma: ricerca per una storia delle tecniche,* Rome 1983, pp. 38–42. The number of rafters and battens were determined by the potential size of the (assumed) marble roof tiles. The size of the marble tiles are based on those used on the Pantheon cupola (Lucos Cozza, "Le tegole di marmo del Pantheon," *Città e architettura nella Roma imperiale: atti del seminario del 27 ottobre 1981 nel 25° anniversario del Accademia di Danimarca*, Odense 1983, pp. 109–118).

13 Beltrami 1898, n. 6, esp. Figs. X–XV, XXII, XXV, XXXIV, and XXXV, summarized in Licht 1968, pp. 172–176; Paola Virgili and Paola Battistelli, "Indagini in piazza della Rotonda e sulla fronte del Pantheon," *Bullettino della Commissione Archeologica Comunale di Roma* 100, 1999, pp. 377–394. See also Chapter Two in this volume.

14 Lancaster 2005, n. 2, p. 59, and Fig. 1; DeLaine 1997, n. 3, p. 132, and Fig. 3; Sheila Gibson, Janet DeLaine, and Amanda Claridge, "The Triclinium of the Domus Flavia: A New Reconstruction," *Papers of the British School at Rome* 62, 1994, pp. 80–86.

15 See G.T. Schwarz, "Antike Vorschriften für Fundamente und ihre Anwendung auf Römische Bauten in der Schweig," *Provincialia Festschrift Rudolf Laur-Belart*, ed. E. Schmid et. al., Basel 1968, pp. 448–453.

16 Note that Licht 1968, p. 92, n. 5, has doubts about the depth of foundations. Even if the clay really

does lie under the foundations, then we might expect that it had previously been consolidated by piling, a common Roman technique in water-logged conditions, especially in road construction.

17 Licht 1968, passim, and especially Figs. 97–99, p. 105.

18 Thanks are due to Nikolaos Theocharis and Michael Heinzelmann of the Pantheon project carried out at the Karman Center in Bern for providing figures for the volume of the dome at different levels, thus avoiding otherwise very difficult calculations.

19 For the brickstamps from the Saepta, see Bloch 1937–1938, pp. 107–108; Hetland 2007, n. 5, p. 100.

20 For the importance of such infrastructure in later periods, see Nicoletta Marconi, "The Baroque Roman Building Yard: Technology and Building Machines in the 'Reverenda Fabbrica' of St. Peter's (16th–18th Centuries)," *Proceedings of the First International Congress of Construction History* 2, ed. Santiago Huerta, Madrid 2003, pp. 1357–1367.

21 The most complete handbook is Giovanni Pegoretti, *Manuale practico per l'estimazione dei lavori architettonici stradali, idraulici e di fortificazione per uso degli ingegneri ed architetti*, 2 vols., Milan 1869.

22 In London in 1749, ordinary brickwork was rated at 1,000 bricks/day, facework 500/day (B. Langley, *The London Prices of Bricklayers' Materials and Works*, London 1749, pp. 87, 100–101). In London in 1865: 700–500 bricks/day (J. T. Hurst, *A Handbook of Formulae, Tables, and Memoranda for Architectural Surveyors and Others Engaged in Building,* London 1865, pp. 214–216. In Italy in 1869: ordinary brickwork, av. 700 bricks/day (Pegoretti 1869, vol. 2, pp. 144–145). The figures have been adjusted for a common working day of 10 hours.

23 For a discussion of principles and justification of choices made, see DeLaine 1997, n. 3, pp. 103–109.

24 Final figures can thus only be considered as generally reliable to the first significant figure, i.e., the first digit plus the order of magnitude, with the second providing some guidance; thus, for example, a calculated total of 4,237.345 days of labor would be given as 4,240 days to three significant figures, but only the 4,000 would be considered really reliable within the specific assumptions made about working conditions, while the 240 would indicate only that the amount was likely to be closer to 4,000 than 5,000.

25 Licht 1968, pp. 38–39, 62, 87, 157, Fig. 193; cf. Chapter Seven in this volume.

26 See Lancaster 2005, pp. 51–53, on the setting and curing of pozzolanic mortars. Tests on a modern reproduction of Roman concrete using *pozzolana* from the Bay of Naples show the concrete still gaining strength after a year (E. Gotti, J. P. Oleson, L. Bottalico, C. Brandon, R. Cucitore, R. L. Holdfelder, "A Comparison of the Chemical and Engineering Characteristics of Ancient Roman Hydraulic Concrete with a Modern Reproduction of Vitruvian Hydraulic Concrete," *Archaeometry* 50, no. 4, 2008, 576–590).

27 See Chapter Seven in this volume.

28 See Chapter Seven in this volume. While Mark Wilson Jones argues that the impetus for this was a crack in the drum of the rotunda that appeared when the drum was half built, it is also worth noting that the vault that supports the upper part of the grottoni must also have been integral to the Basilica of Neptune, which was less likely to have been able to resist any excess thrust from the Pantheon than vice versa. It is thus possible that the impetus to build the bridge was some structural problem with the Basilica, not with the Pantheon. Note that Licht 1968, p. 148, associates the second buttress behind the Basilica of Neptune apse with the Basilica, not the Pantheon drum. Unfortunately, not enough of the Basilica remains to test this hypothesis.

29 See Chapter Seven in this volume, and cf. Paul Davies, David Hemsoll, and Mark Wilson Jones, "The Pantheon: Triumph of Rome or Triumph of Compromise?" *Art History* 10, 1987, pp. 133–153; Mark Wilson Jones, *Principles of Roman Architecture*, New Haven 2000, pp. 199–211.

30 See Rita Volpe and F. M. Rossi, "Nuovi dati sull'esedra sud-ovest delle Terme di Traiano sul Colle Oppio: percorsi, iscrizioni dipinte e tempi di costruzione," in S. Camporeale, H. Dessales, and A. Pizzo, eds., *Arqueología de la Construcción*, vol. 3: *Los procesos constructivos en el mundo romano: la economía de las obras*, Anejos de Archivo Español de Arqueología LXIV, Madrid-Merida, 2012, pp. 69–82.

31 John R. Spencer, *Filarete's Treatise of Architecture*, New Haven 1967, IV.23v; Volpe and Rossi 2012, pp. 69–82.

32 This can be calculated as follows, using the lower zone of the rotunda as an example (figures from Table 6.1):Total mandays of bricklayer and assistant laying face, core, and arches/bonding courses = 684 + 40,300 + 240 = 41,224 mandays

Since one-third of this is for the assistants, total mandays of bricklayer working at face = 41,224 x 0.667 = 27,482 mandays

Since maximum number of bricklayers is 104, minimum number of days = 27,482 ÷ 104 = 264.

33 Hetland 2007 and Chapter Three in this volume.

34 Herbert Bloch, *I bolli laterizi e la storia edilizia romana. Contributi all'archeologia e alla storia romana (1936–1938)*, Rome 1947, pp. 103–107.

35 For two different examples, see Herbert Bloch, "The Serapeum of Ostia and the Brick Stamps o 123 AD," *American Journal of Archaeology* 63, 1959, pp. 225–240; Janet DeLaine, "Building Activity in Ostia in the Second Century AD," *Acta Instituti Romani Finlandiae* 26, 2002, pp. 41–102; pp. 93–99.

36 See Chapter Seven in this volume.

37 Pliny the Elder, *Naturalis Historia*, 36, 55, records an old prescription in Rome that forbade the use of lime that had been slaked for less than three months.

38 There is evidence to suggest that the area in front of the Mausoleum of Augustus may have been used as a marble working yard for the Pantheon. See Lothar Haselberger, "Ein Giebelriss der Vorhalle des Pantheon. Die Werkrisse vor dem Augustusmausoleum," *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung* 101, 1994, pp. 279–308; cf. Martin Maischberger, *Marmor in Rom: Anlieferung, Lager- und Werkplätze in der Kaiserzeit*, Wiesbaden 1997.

39 See Chapter Seven in this volume.

40 See Bloch 1937–1938, pp. 107, 115, and cf. Chapter Three in this volume.

41 DeLaine 1997, n. 3, pp. 191–193, Tables 21–23. This is just for construction, and just for the central block. Even more men were required for the extensive substructures, as many as 9,000 if these were built in a single year.

42 For the brickstamps of the Saepta dated to 123 and 127, see Bloch 1937–1938, pp. 110–111. For the Baths of Agrippa, see Giuseppina Ghini, "Thermae Agrippae," in E. M. Steinby, ed., *Lexicon Topographicum Urbis Romae*, vols. 1–5, Rome 1995–1999; vol. 5, 1999, pp. 40–42. The Scriptores Historiae Augustae (*Vita Hadr.* xix.10) also lists the Basilica of Neptune, the Saepta, and the Baths of Agrippa alongside the Pantheon among the buildings Hadrian restored at Rome.

43 Amanda Claridge, "Hadrian's Lost Temple of Trajan," *Journal of Roman Archaeology* 20, 2007, 54–94.

44 See note 29.

45 A. Cassatella, "Venus et Roma, Aedes, Templum," in Steinby 1995–1999, vol. 5, 1999, pp. 121–123.

Seven Building on Adversity: The Pantheon and Problems with Its Construction

Mark Wilson Jones

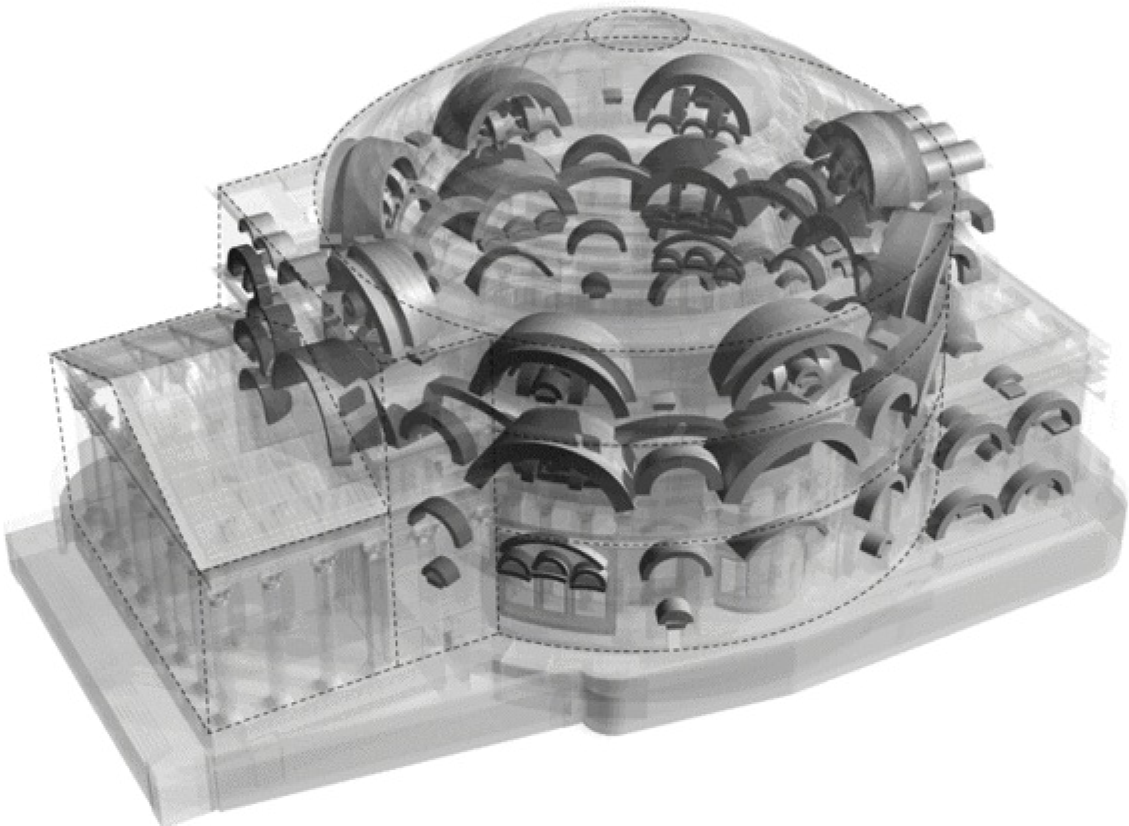
The fame of the Pantheon derives substantially from its wondrous engineering. The immense clear span went unchallenged for thirteen centuries until Brunelleschi raised the dome of Florence's cathedral, and still the ancient feat is unrivaled as a work of unreinforced concrete. This prompts many questions for the casual visitor and the specialist alike. How was the building constructed? How long did it take to erect? What was the relationship between the various parts? In conjunction with the research of Janet DeLaine, Giangiacomo Martines, and Gene Waddell in this same volume my aim is to advance these questions to the point of charting and explaining the sequence of building operations that is summarized graphically in Plate XIII.

One way of framing the inquiry is to ponder why the Pantheon has survived intact despite the passage of almost nineteen centuries, bearing in mind that so many other Roman wide-span buildings have not. It is characteristic of this enigmatic monument that the answer is not entirely straightforward. The Pantheon owes its survival to its transformation into a church in the early seventh century, yet doubtless this initiative reflected admiration for the grandeur of the Rotunda in the first place. In any event, the acquired Christian status ensured some remedy for the various injuries suffered down the ages. Most notably, as a replacement for the earlier theft of its original gilded bronze tiles, the dome received a lead covering during the reign of Gregory III in the eighth century. This represented by far the most important single protective measure – who can guess how many other imperial interiors would have survived if they, too, had had their roofs maintained? The front end of the building had a more checkered fortune. Bell towers and the like were added and removed from time to time, while a convent, shops, stores, and hovels latched on to the structure like limpets; each intervention inevitably brought a degree of destruction, contributing to the dilapidation and partial collapse of the east end of the portico.

It is perhaps surprising that more has not collapsed than just a portion of the portico. After all, the interior span comfortably exceeds any other ancient rival; the actual figure of 43.7 meters, measured from wall to wall, was determined by the axial diameter assigned to the ring of columns of 150 Roman feet (44.3 meters). The next largest surviving Roman domes spanned closer to 100 feet, this being the diameter of the misnamed Temple of Diana at Baiae.[1] Other large domes may once have existed of which we have no trace, yet clearly the Pantheon was an exceptionally ambitious undertaking even by the standards of the high imperial period.

The Pantheon's survival depends most of all on the technical quality of Roman construction, which reached its apogee in the first half of the second century AD. This derived from a long tradition of intelligent experimentation with materials (primarily brick and concrete) and spatial-constructional units (arches, vaults, and the special kind of vaults we call domes).[2] Illustrative of the attention to technique of the Pantheon's builders is the grading by density of the aggregate in the concrete, with the heaviest at the bottom and the lightest at the top (see Fig. 1.12). In the upper parts of the dome pumice

(or, rather, scoria) was used, a lightweight volcanic material from the region around Vesuvius, which was acquired only with difficulty after the eruption of AD 79 had covered the best deposits under inferior material.[3] As Martines relates in Chapter Four, Roman builders also placed much faith in so-called relieving arches, and here too the Pantheon provides the most elaborate known array (Fig. 7.1, and see Fig. 1.13).



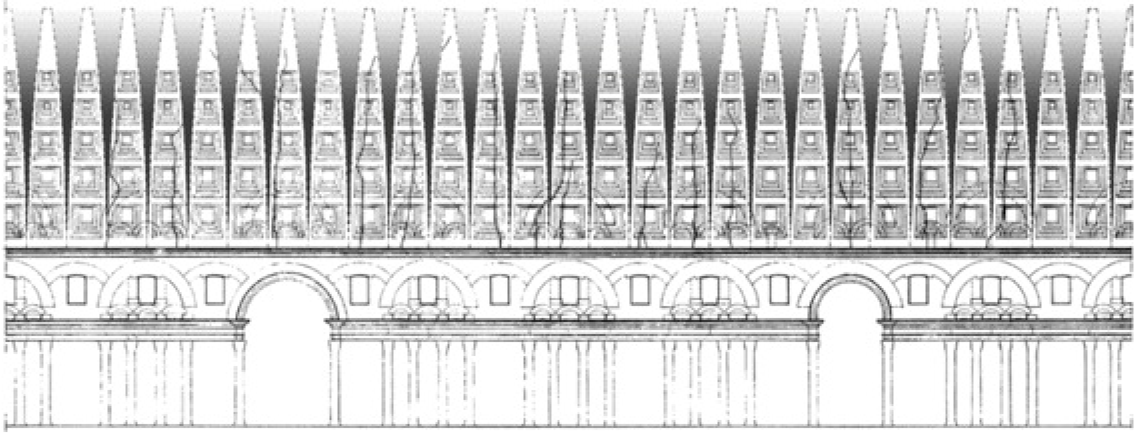
7.1. Armature of relieving arches embedded in the Pantheon. (Drawing Mark Wilson Jones and Robert Grover)

The Pantheon stands today, triumphant, yet the grandness of its ambition tested the Roman building machine almost to the point of disaster. It is impossible to say exactly how close failure came; all we can do is witness signs of structural distress and constructional difficulty. These are particularly notable in three respects: the long cracks that fracture the rotunda at intervals; the building complex that butts up against the rotunda to the south, the very existence of which speaks of emergency; and the curious mismarriage between rotunda and portico. While not in itself a structural issue, this, it seems, was bound up with problems in obtaining the massive column shafts originally intended. This essay looks into these matters and reflects on the drama of the Pantheon worksite. As I see it, the project was balanced on a knife edge between success and failure. It was success that prevailed – but at the cost of perfection compromised.

Cracking, Concrete, and Centering

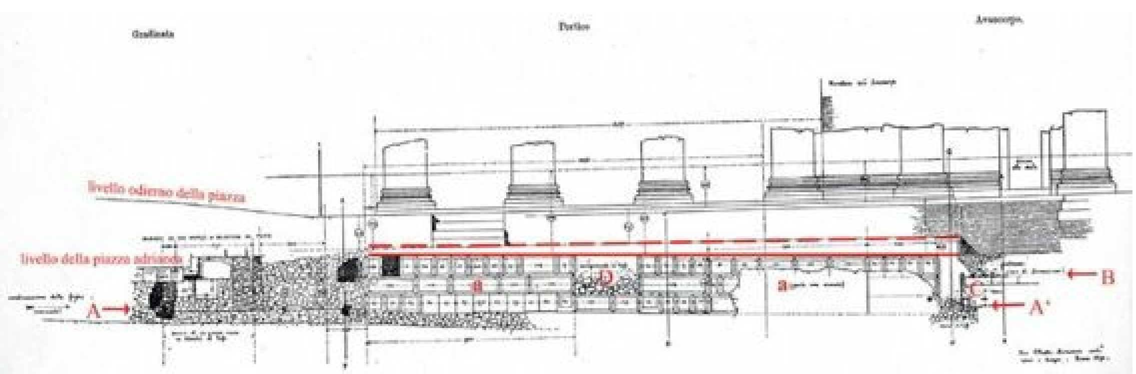
The rotunda displays an array of more or less vertical cracks. Typically, they run from about halfway up the rotunda to halfway up the dome. The mapping of these cracks in the 1930s by Alberto Terenzio during restoration works gives us the best idea of their scale and frequency (Fig. 7.2).[4] Many can be seen in old photographs, though today most are obscured by surface finishes or by modern repairs.

Nonetheless, parts of some can still be seen on the outside of the rotunda, while one can be traced in the staircase on the east side of the entrance. The largest crack coincides with the main axis on the south side, measuring up to 7 centimeters in width where it can be accessed from behind the rotunda.



7.2. Interior elevation of the rotunda, projected flat, showing the principal cracks in the structure. (Wilson Jones 2000, Fig. 9.21a; drawing by Ippolita D'Ayala Valva, after A. Terenzio)

Cracking is important for the way the dome behaves in terms of statics. It performs less like a modern monolithic shell reinforced with steel and more like an array of tapering sections of masonry comparable with segments of an orange. This is consistent with the effect of outward lateral thrust and hoop tension, both being characteristic of unreinforced domes with profiles based on arcs of circles (as opposed to catenary curves, which offer a reduction in tensile forces).[5] Deformation of the section resulted, with the interior of the dome no longer matching an ideal hemisphere. Recent survey work with laser scanners conducted by the Karman Center reveals that the crown has slumped by around 1½ feet (45 centimeters) with respect to its presumed original hemispherical form. In relative terms, this equates to only about 1 percent of the total height, but in real terms, it still represents a significant shifting of stress and mass. A further cause of structural distress was settlement, for the Pantheon rises not on rock but on clay.[6] The floor level slopes down by almost 40 centimeters from the front of the portico to the far side of the rotunda (see Plate XXI).[7] Most of the cracking would have occurred early in the life of the building, though not necessarily all at once when the centering used to shape the dome was dismantled. Some cracking seems to have arisen even before the dome was put in place, as we shall see.[8]



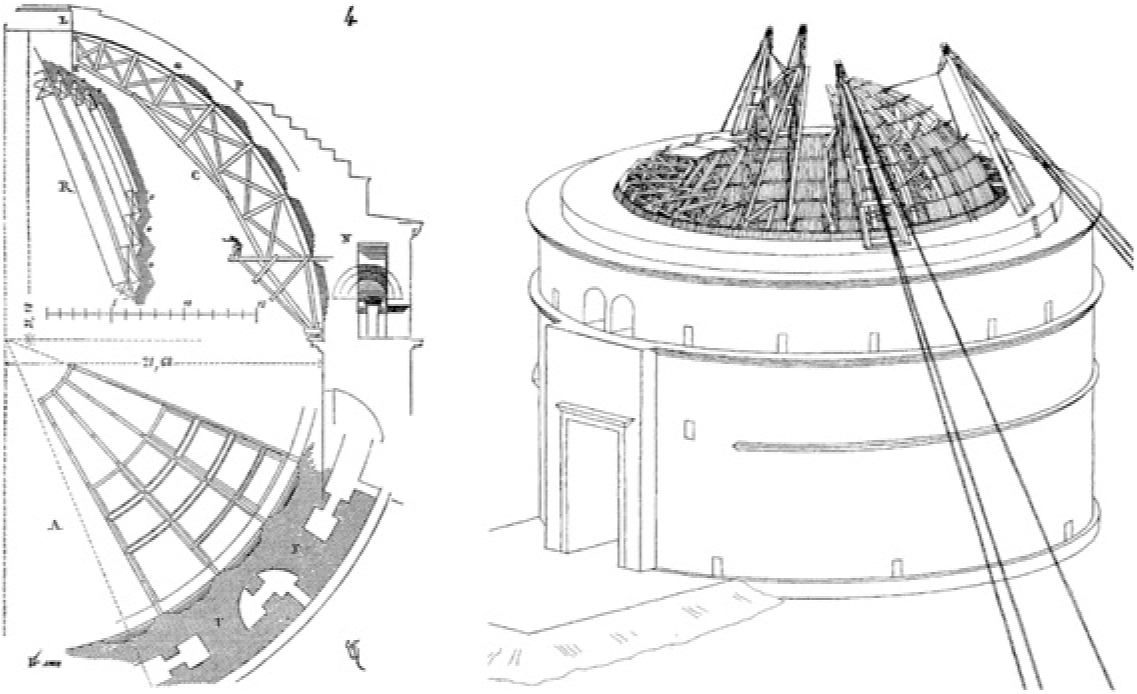
XXI. Section combining information from excavations under portico and rotunda, with sloping floor of Agrippan Pantheon shown in dashed line and XXXX shown in solid line. (Pier Olinto Armanini in Beltrami 1898, Fig. XV)

It would be a mistake to make more than a casual analogy between Roman lime-based concrete and its modern cement-based equivalent, which is typically poured in one go in a relatively liquid state (with formwork initially supporting its entire weight).[9] Modern concrete includes steel to provide tensile strength and combat cracking. By contrast, the Romans addressed performance by varying the density of aggregate, by incorporating relieving arches, and by manipulating the cross section. In fact, in understanding the dome of the Pantheon, it is crucial to distinguish between the upper half, which is a relatively thin shell, and the lower half, which is much thicker and has a quite different profile (see Figs. 1.12 and 6.3). The lower part of the dome is as thick as the drum and contiguous with it; at the crowning cornice of the drum, the section reduces (making space for a perimeter walkway), thereafter diminishing in a series of large steps until the start of the upper shell. None of this can be perceived inside the building, where the visual effect is largely determined by the coffering that follows its own independent geometry.

Construction of the lower part of the dome proceeded by stages, as for the rotunda wall. Ring followed ring, each diminishing in diameter, typically in lifts of 5 feet or so. The concrete was laid relatively dry, in more or less horizontal strata of mortar and aggregate in predominantly fist-sized pieces. Each stage would have been allowed to cure substantially before the next was added. By virtue of closing in on itself, each ring, once complete, could support not only itself but also the next ring slightly smaller in diameter, and so on, creating in effect a kind of corbeling. Higher up, after the top of the step-rings where the section is thinner, the vault was flatter, therefore demanding some kind of support up until the time when the concrete set (or "went off"). Finally, at the very top, the device of an oculus represented a wonderful solution: avoiding construction, lightening the dome while lighting the finished space, besides contributing to its symbolic mystique.

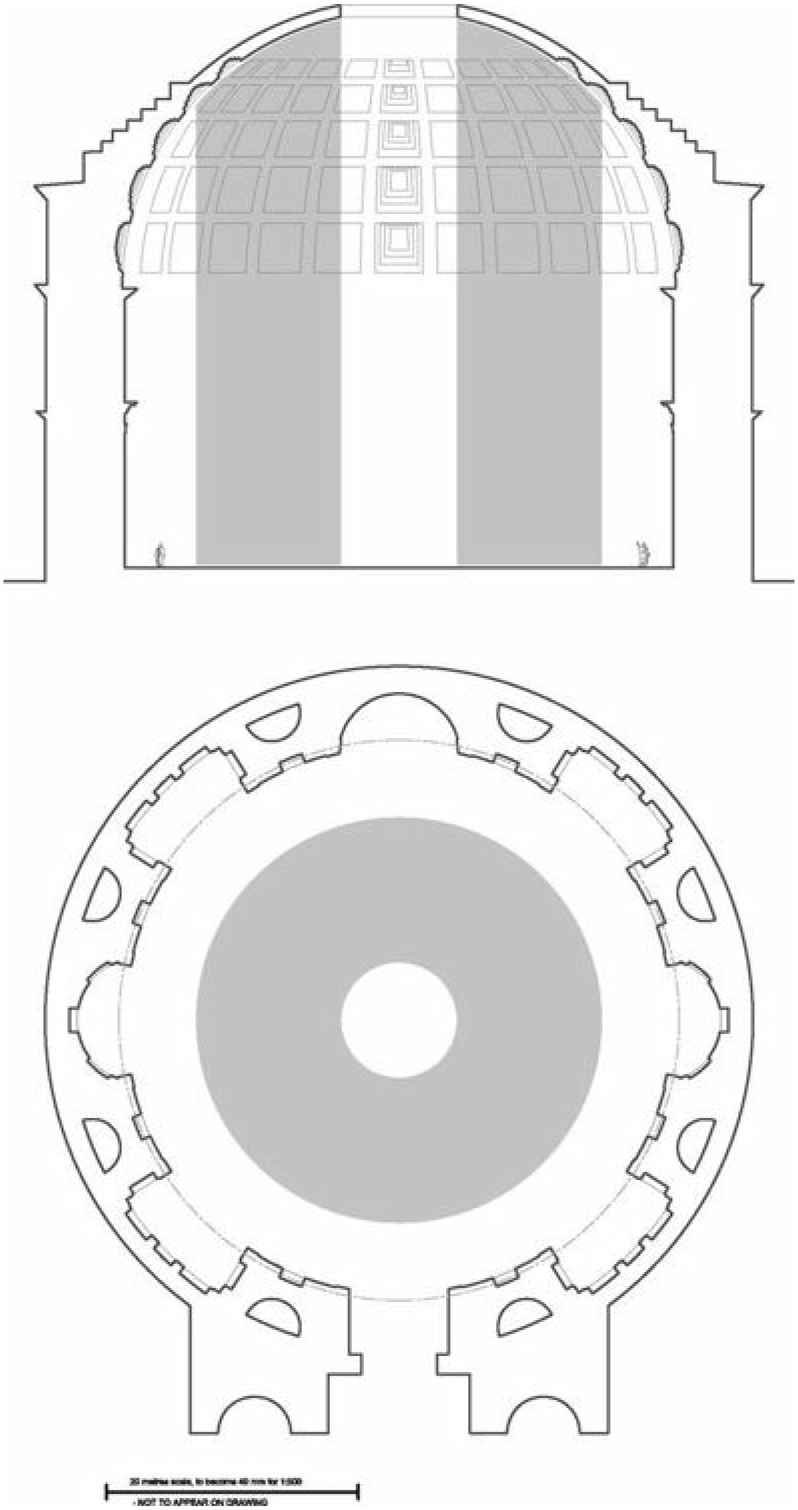
It is theoretically possible to build a lime-based concrete dome without any temporary support.[10] But as regards Roman practice, there is plenty of evidence for the use of formwork; witness the imprints of wooden boarding on the vaulting of many a ruin, including Nero's Golden House (the Domus Aurea), Trajan's Markets, and Hadrian's Villa. It is, unfortunately, impossible to obtain this kind of information for the Pantheon, for the rendered internal surfaces of the dome that we see today are the result of only the latest of a number of restorations, some of which date from a time before it had become customary to document the existing state prior to the commencement of work. The possibility of self-support can be reconciled with the use of formwork if we suppose that a temporary wooden assembly provided structural support for the upper parts alone. For the lower parts, the prime function of the formwork, just as its name suggests, was only to mold the form of the concrete. This was necessary for the geometrical precision of the Pantheon coffering, which creates such a magical dance of chiseled planes of light and shadow.

How was the wooden formwork itself erected? Some authorities opt for a system supported from the ground for the full width of the interior. William MacDonald visualizes "an immense hemispherical wooden form, supported by a forest of timbers and struts."[11] Recoiling at the consumption of trees on such a scale, others have imagined centering "flying" across the entire space without vertical supports. Proposals in this vein include those put forward by Eugène Emmanuel Viollet-le-Duc (Fig. 7.3, left) and most recently Rabun Taylor (Fig. 7.3, right).[12]



7.3. Proposals for the centering used to construct the dome. (Left, Viollet-le-Duc 1875, p. 475; right, Taylor 2003, Fig. 120)

Any uniform system of centering, however, seems to be contradicted by the marked difference between the lower and upper halves of the Pantheon dome that has already been highlighted. Accordingly, I visualize a very substantial wooden tower rising from a doughnut-shaped plan, with a ring about 11.5 meters wide (Fig. 7.4).[13] The upper portion of the dome, being relatively thin, was light enough to have been carried on such a timber structure.[14] Nothing, of course, was needed underneath the void of the oculus, nor indeed for the lower portion of the dome. Since this could be raised by corbeling, all that was required here was non-load-bearing formwork. This part of the wooden assembly alone would have "flown," spanning a gap of 5 to 6 meters between the drum and the doughnut-shaped tower.[15]



7.4. Schematic cross section showing extent (in gray tone) of a hypothetical doughnut-shaped centering tower for constructing the dome, 1:600. (Drawing Mark Wilson Jones)

The quantity of timber consumed must have been considerable, but not beyond the Romans' capabilities. They had at their disposal extensive forests of oak and sweet chestnut not far from the capital, and are known tohave employed very large timbers, for example, for the trusses spanning the 25-meter-wide nave of Trajan's majestic Basilica Ulpia. In a treatise on the construction of siege structures, the *Poliorcetica*, this emperor's architect, Apollodorus, expounded on the assembly of giant towers using small timber members. The surviving copy, which dates to the Middle Ages, has illustrations that convey an almost naive impression, but the original versions may well have been more precise and technical.[16]

By virtue of experience, imperial architects must have been aware that domes pushed outward at the haunches. Three main counterstrategies were adopted in the Pantheon. The first is a very thick supporting wall (thicker than simple vertical loading would require), which, to save materials and weight, was hollowed out by voids in the form of exedras and chambers (see Chapter Four). The second is the carrying up of the drum to a higher level than the springing of the dome, thus creating a mass of weight resistant to lateral movement. The third is the most obscure in its functioning: the vaults and arches embedded within the concrete known as relieving arches, which were made using tile-shaped bricks, mostly 2-foot-square *bipedales* with some 1.5-foot-square *sesquipedales*. As already noted, the Pantheon boasts the most elaborate known arrangement of relieving arches (Fig. 7.1). In part, they served to direct loadpaths to points of greatest strength, the eight "piers" of the rotunda plan. They also facilitated constructional processes, an important consideration for Roman builders. Since brick and mortar cured faster than concrete, the use of relieving arches enabled work to proceed upward faster than would otherwise have been the case.[17] Although it is hard to know the full range of the ways in which they work – or were thought to work – we can still judge them, almost two thousand years later, wonderfully efficacious.

The Grottoni

In spite of these strategies, the stability of the Pantheon was not a foregone conclusion – indeed, it was evidently a matter of great concern for the builders. This is demonstrated by the annex of structures sandwiched between the rotunda and the adjacent basilica to the south (Fig. 7.5, and see Fig. 6.5). Parallel walls and associated floors and vaulting delimit a series of spaces on two levels that are collectively known in Italian, rather suggestively, as the *grottoni*. Above them, on the main axis, a solid brick arch supported a kind of bridge connecting the basilica with the rotunda. This whole complex constituted, in effect, a gigantic buttress, as may be deduced from the lack of any obvious ceremonial or utilitarian purpose, along with the crude fashion in which it butts up against the rotunda.[18] Indeed, it is plain to see that the lower parts of the grottoni are not bonded with the rotunda.

7.5. Rotunda viewed from the south, above the *grottoni*. Note the scarring (particularly evident at and above the level of the three openings visible in the middle of the photograph), which testifies to the presence of a lost connection or "bridge" with the basilica to the rear (south) of the grottoni. (Photo Gene Waddell)

It is generally assumed that the grottoni were created after the completion of the rotunda, as an improvised post facto countermeasure to resist its outward pressure. However, my own observations suggest that work on the grottoni began relatively early. The key here is the connection between the rotunda and the structure overhead. Instead of casually butting up to the rotunda as occurs at low level, the "bridge" has a cornice that meets the middle cornice of the rotunda at a bonded miter, or, in other words, in a premeditated relationship.[19] The springing of the arches of bipedales is integral with the rotunda, as shown by photographs taken at the time when parts of the grottoni were rebuilt, and as is still observable at high level (Fig. 7.5). Where fabric associated with the bridge has been lost, the drum is not smooth, as we should expect had an extraneous construction simply fallen away. Instead, material integral to the rotunda has been pulled away.[20] Relieving arches belonging to the bridge once thrust into the rotunda, hence the faces of bipedales that are now exposed to view. Despite the lack of bond below, then, at high level construction is all of a piece.

This rather extraordinary state of affairs suggests, firstly, that the grottoni were initiated after the drum had risen to around a third of its height, and, secondly, *that they were built speedily so as to catch up with the drum*. This occurred before the dome was begun (or, at any rate, before it curved inward to a significant extent). All this suggests that the grottoni were built very fast. A rapid pace of work is attested at Trajan's Baths by dates inscribed in red pigment on brick-faced concrete walls of broadly comparable width with those of the grottoni; the dates indicate that over a period of around two and a half months, one wall rose by an astonishing 15 meters. The vast substructures of the baths, comprising many other walls equally tall, were probably executed in a single season.[21] We can only

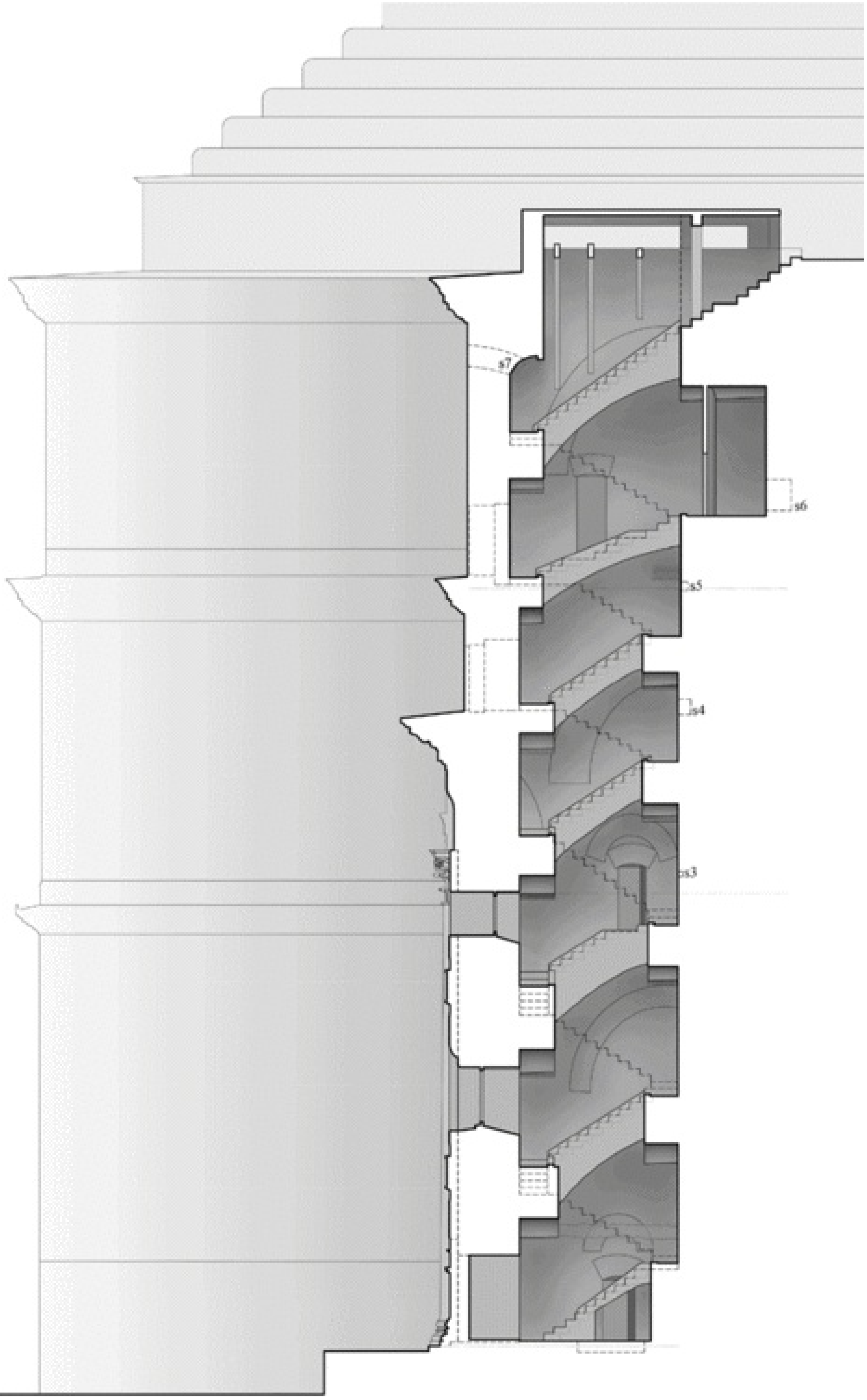
speculate how fast the grottoni were built, yet bearing this comparison in mind, a couple of years or less is not out of the question.

It seems, therefore, that the grottoni respond to a problem that occurred early, *before* the addition of the dome. The nature of the problem is suggested by the huge crack, already mentioned, that fractures the rotunda approximately on the main axis, where the wall defining the apse is at its thinnest. Unlike other cracks, which tend to peter out earlier, this one reached floor level.[22] The cause could be settlement of the foundations, although this cannot be proved without a geotechnical investigation. In short, the grottoni were built so as to minimize the further movement expected when the thrust of the dome came into play. The intervention can be judged a success; despite the alarm it registers the Pantheon stands.

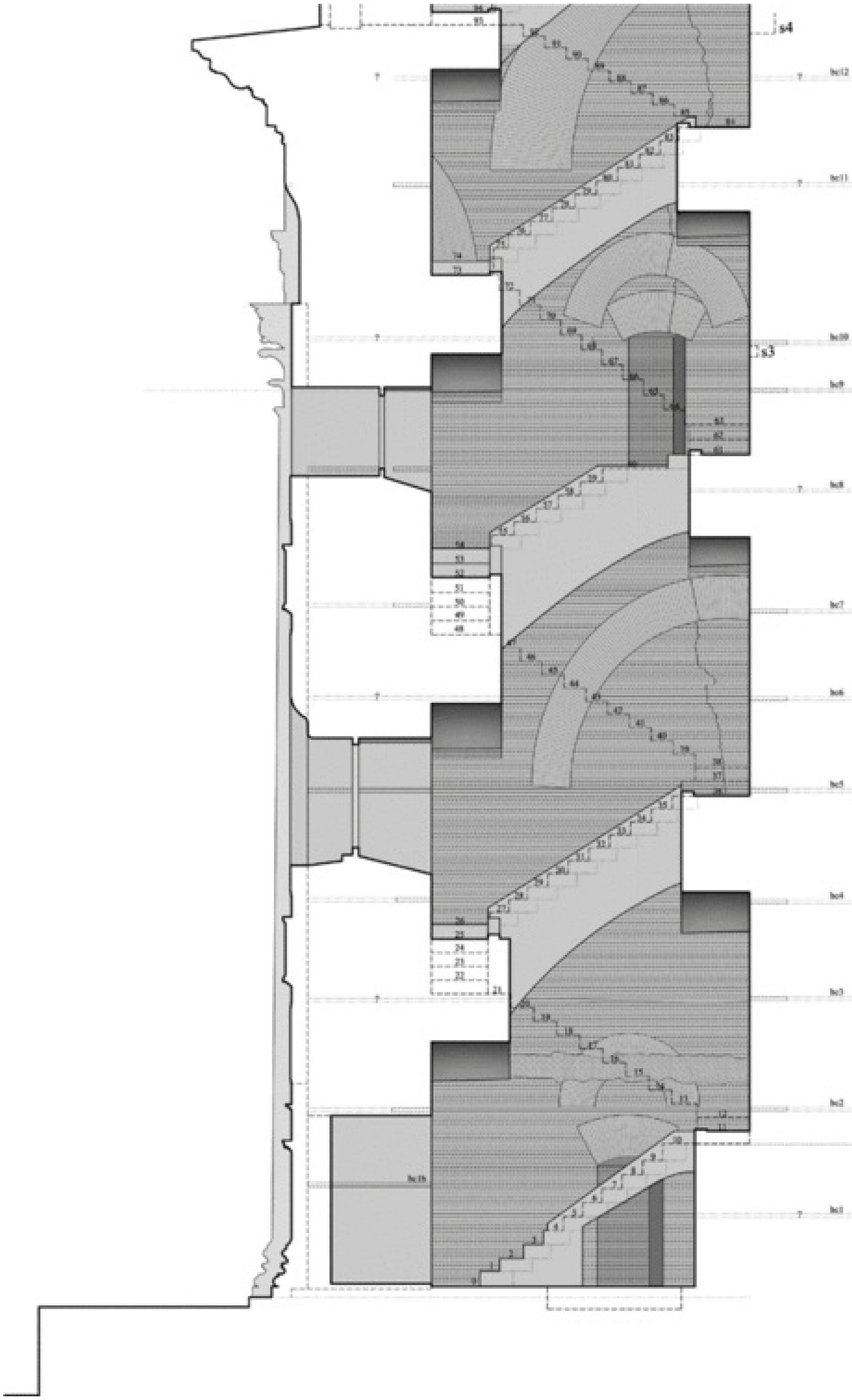
The Connection between Rotunda and Transitional Block

Different problems affected the north end of the Pantheon where its three main parts meet: rotunda, portico, and the structure in between. This is known in Italian as the *avancorpo,* and, rather less elegantly, as the “transitional block” or “intermediate block.” As noted in the Introduction (Chapter One), over the centuries the relationship among these three parts has provoked markedly contrasting interpretations. Traditionally, the explanation was thought to lie in (various different) phasing sequences, with the rotunda usually being presumed to have been built before the rest.[23] Bound up as it is with perceived compositional shortcomings, the debate has an inevitable subjective component, and so it makes sense to address objective constructional realities first.

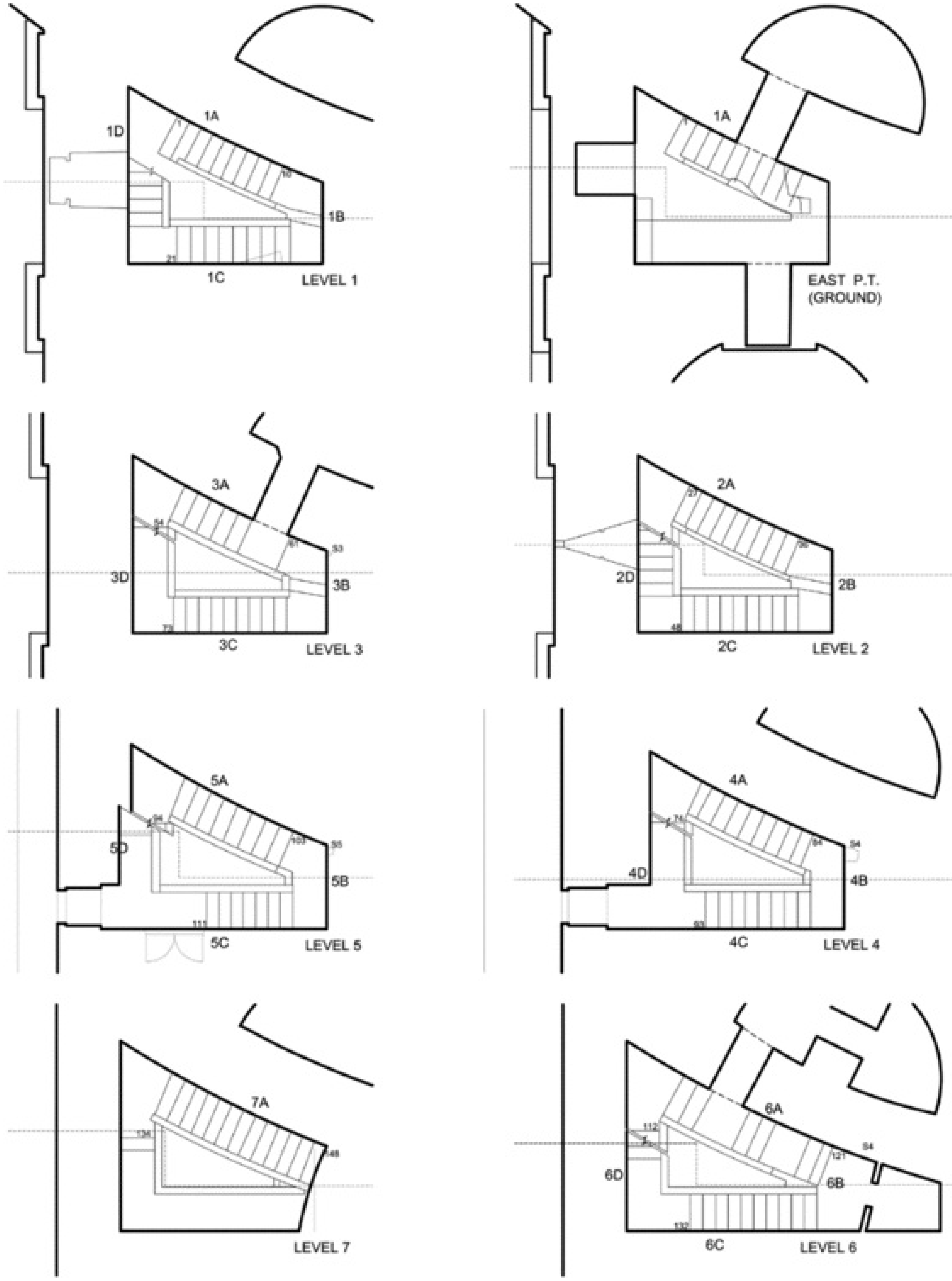
The junction between rotunda and transitional block can best be observed in the two staircases on either side of the entrance. Unlike other parts of the building, there is no marble revetment here to hinder inspection, while the stairs facilitate access for the entire height – an enormous practical advantage for the purposes of study. Achille Leclère, one of the long line of prize-winning architects awarded a period of residence at the French Academy in Rome, included a small-scale survey as part of his *envoi* of 1813 on the Pantheon.[24] Otherwise this part of the building has been neglected, leading me to make a new survey in 2005 and 2006 of the east stair, the better preserved of the two, yielding the drawings illustrated in Figures 7.6, 7.7, and 7.8.[25] These also help locate pertinent details, such as the soundings, or *saggi*, made by previous investigators where the rotunda wall (labeled A) meets the side walls (B and D) of the transitional block.



7.6. Pantheon, east stair, section. (Drawing Mark Wilson Jones and Robert Grover)



7.7. Pantheon, east stair. (Drawing Mark Wilson Jones and Robert Grover)



7.8. Pantheon, east stair, plan. (Drawing Mark Wilson Jones and Roberta Zaccara)

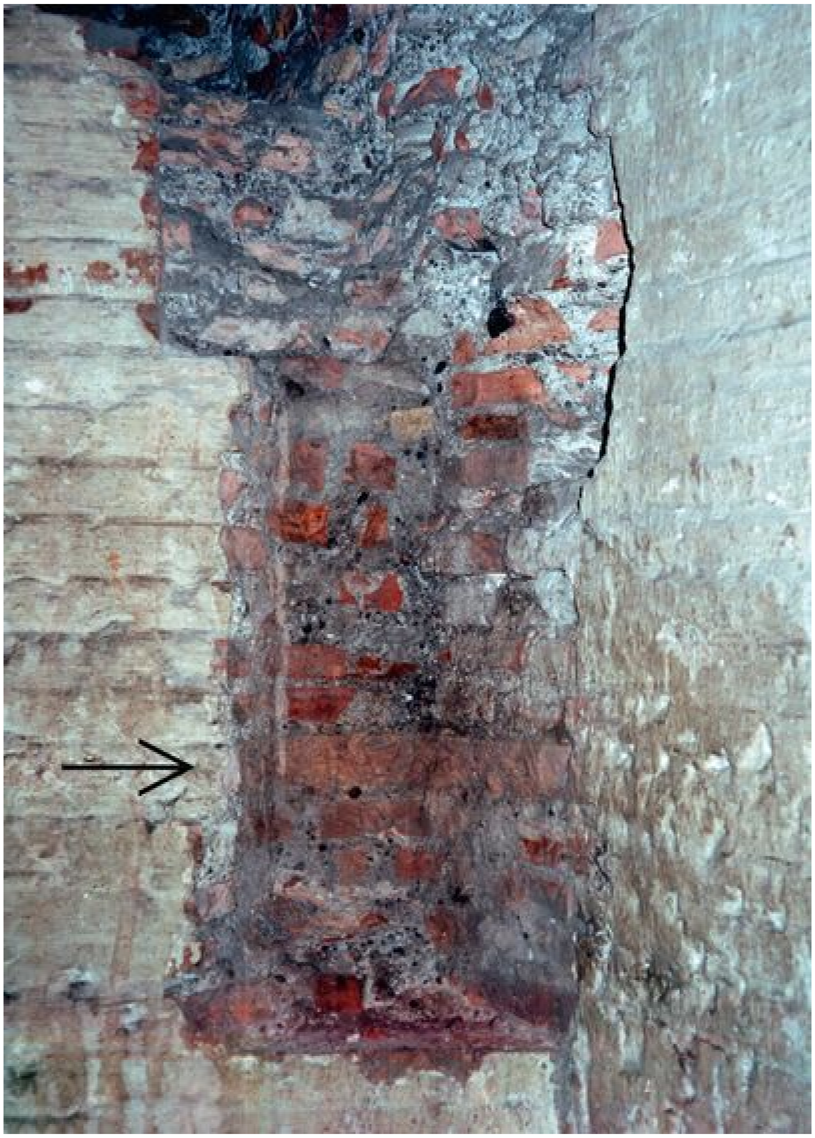
Today, the east stair is entered from one of the two great apses of the portico, the ancient doorway on the flank having been blocked up. The stairs have suffered reconfiguration at the top and bottom, but otherwise remain essentially unchanged. The trapezoidal plan makes six full turns plus an extra seventh flight against the curved wall of the rotunda. They afford access to several different parts of the building: to the semicircular chambers in the drum on three levels, to the suite of rooms fronting the transitional block occupied by the Virtuosi of the Pantheon, to the entablature of the portico, to the middle cornice of the rotunda, and finally to the roof (Figs. 7.6, 7.7, 7.8, 7.9).

7.9. Junction of the rotunda, transitional block, and portico on the east side, at high level. (Photo Mark Wilson Jones)

Inspection of the staircases shows that the rotunda and the transitional block are *united* at low level, but *disunited* at high level. It seems that both rose as one until somewhere in the region of 12 to 14 meters from the floor of the portico. From then on, work evidently proceeded on the rotunda alone, pending the completion of the transitional block.

At high level, the disjunction is obvious to the untrained eye. Wherever the rotunda is exposed to view it presents finished surfaces that can only have existed if it were built first (Plate XXII). Since the Pantheon stands intact and not exposed for study like a ruin, the unity of the lower parts is less glaringly evident, yet nonetheless inescapable. A key piece of evidence is a sounding, or *saggio*, located on the second short landing of the west stair, at the junction between the rotunda and the transitional block (see Plate XXIII). The ample view it offers into the "guts" of the fabric (the sounding reaches 63 centimeters deep) reveals no gap, crack, or joint, and the mortar traverses uninterrupted. In addition, there is a course of bipedales that passes unbroken from one part to the other, including a whole *bipedalis* right where they meet. It would have been quite impossible to insert so large and brittle an element after the original construction.[26] So both the rotunda and the transitional block rose together at low level, although about halfway up, construction advanced on the rotunda while that of the transitional block was held back.

XXII. Pantheon, east stair, sounding “S7” near the top of the rotunda. (Photo Mark Wilson Jones)



XXIII. West stair, detail of sounding on level 2. This shows the “gut” of the construction at the junction between the rotunda and transitional block. Note the continuity of mortar and aggregate, as well as a whole bipedalis (indicated by arrow) that traverses the junction. (Photo Mark Wilson Jones)

XXIV. Manfredo Manfredi, permanent tomb of Vittorio Emanuele II, lateral niche of the Pantheon, begun 1884. (Photo Robin B. Williams)

These observations effectively eliminate all previous proposals that would claim that the main parts of the Pantheon were built completely separately. That the rotunda was never planned to stand on its own is further confirmed by the connections between the staircase and the chambers encased within the drum (Figs. 7.7, 7.8). These connections, being perfectly intact, were part of the original construction. This confirms what has become evident given the other considerations mentioned: the stairs were anticipated from the outset. And if the stairs were envisaged, so too must have been the transitional block as a whole.

Inspection of the brickwork surfaces and of the courses of bipedales running around the stair offers

further clarification of the relationship between parts of the fabric. The courses of bipedales are particularly instructive, for they traverse at intervals the entire thickness of construction, like layers in a layer cake (Fig. 7.7 and Plate XXIII). In the lower half of the staircase, the bipedales, save for a few exceptions, run at the same level around all four walls, which suggests that these were coeval. This coordination is less pronounced higher up, but one bipedalis course on the sixth turn of the stairs runs right around the staircase and *all the way to the dome*. That this occurs in spite of the separation between the rotunda and the transitional block points to the temporal proximity of the entire complex, suggesting that work on the latter only suffered a short-lived hiatus. Operations must have resumed on the upper half of the transitional block quite quickly, probably within a year or two.[27]

The Connection between Transitional Block and Portico

The excavations of the 1890s supervised by Luca Beltrami indicated that the foundations of the existing portico and those of the transitional block were made at the same time. This was later confirmed by A. M. Colini and Italo Gismondi in their study.[28] They also reinforced Leclère's observation of the continuity displayed by the entablature running longitudinally, noting that the blocks incorporating the capitals of the pilasters in the portico are embedded into the fabric of the transitional block too deeply to have been inserted in a separate epoch.[29] (Part of the rough marble of a capital block can be seen where it disappears into the masonry in Figure 7.10, right, though it is impossible to gauge the full extent of its penetration; this is indeed considerable, as I have been able to observe from close quarters when there was scaffolding in place.) Colini and Gismondi also noted that the brickwork facing the transitional block has a single inclined line of bipedales tracking just above the portico roof, but not at exactly the same angle. This suggests perhaps that the roof was contemplated when this part of the transitional block was built, though some adjustments came to be made in the course of execution.[30]

7.10. Pantheon, vestibule, and transitional block at the junction with the portico. Note the unusual grouping of pilasters, and in particular the conjunction of one that forms part of the transitional block with the three-pilaster-faced anta. All four of the antae in the portico have sides toward the great niches that are wider than the other faces. This creates a “leftover” rough portion on each of the capital blocks, since the capitals proper are maintained the same width throughout. The result may be seen on the far right. This and other capital blocks are embedded into the fabric of the transitional block. (Photo Mark Wilson Jones)

The portico and transitional block were, then, planned together and their joint foundations implemented together. The portico cannot have been added in a completely separate campaign. This does not mean, however, that both marched exactly in step. In fact, the raising of columnar structures was normally carried out after completion of any associated masonry structure (see Chapter Six), while there were also reasons that led to a greater delay than normal in this particular instance, as we shall see.

To summarize our examination so far, the fabric of the Pantheon reveals the following:

- All three main parts of the Pantheon, rotunda, transitional block, and portico, belong to a unitary initial conception.
- At the south end, the grottoni were not part of the original project; they were added after the commencement of the rotunda, but were built so quickly as to catch up and become united with it before the dome was far advanced.
- At the north end, the rotunda and transitional block are bonded at the bottom, but about halfway up the elevation the procedure changed. Work was next carried forward on the rotunda alone, with the rest of the transitional block following on soon afterwards.
- A portico was planned as part of the project from the outset, but it was the last major part of the edifice to be implemented.

The curious phasing of the grottoni can be explained as a response to concerns about the stability of the rotunda, while building the portico last made practical sense. But how can we explain the interruption of work on the transitional block?

Can there be an explanation of a structural kind, for example differential settlement between the rotunda and the transitional block? However, there are no signs of such. Those lesions that are present in the staircases respond to the general pattern of cracks affecting the rotunda as a whole, and they tend to peter out before ground level. There is no cracking visible in the sounding in the west stair where the rotunda and the transitional block intersect (Plate XXIII). Nor are there any significant lesions in the side walls of the staircase (those that run north–south). What explains, then, the hiatus in building the latter? This is an issue, I contend, that cannot be resolved by focusing on construction alone. It is now time to turn to issues of design that might bear on the same puzzle.

The Front of the Pantheon and the “Compromise Hypothesis”

While the structure of the Pantheon solicits both wonder and alarm, its design has historically

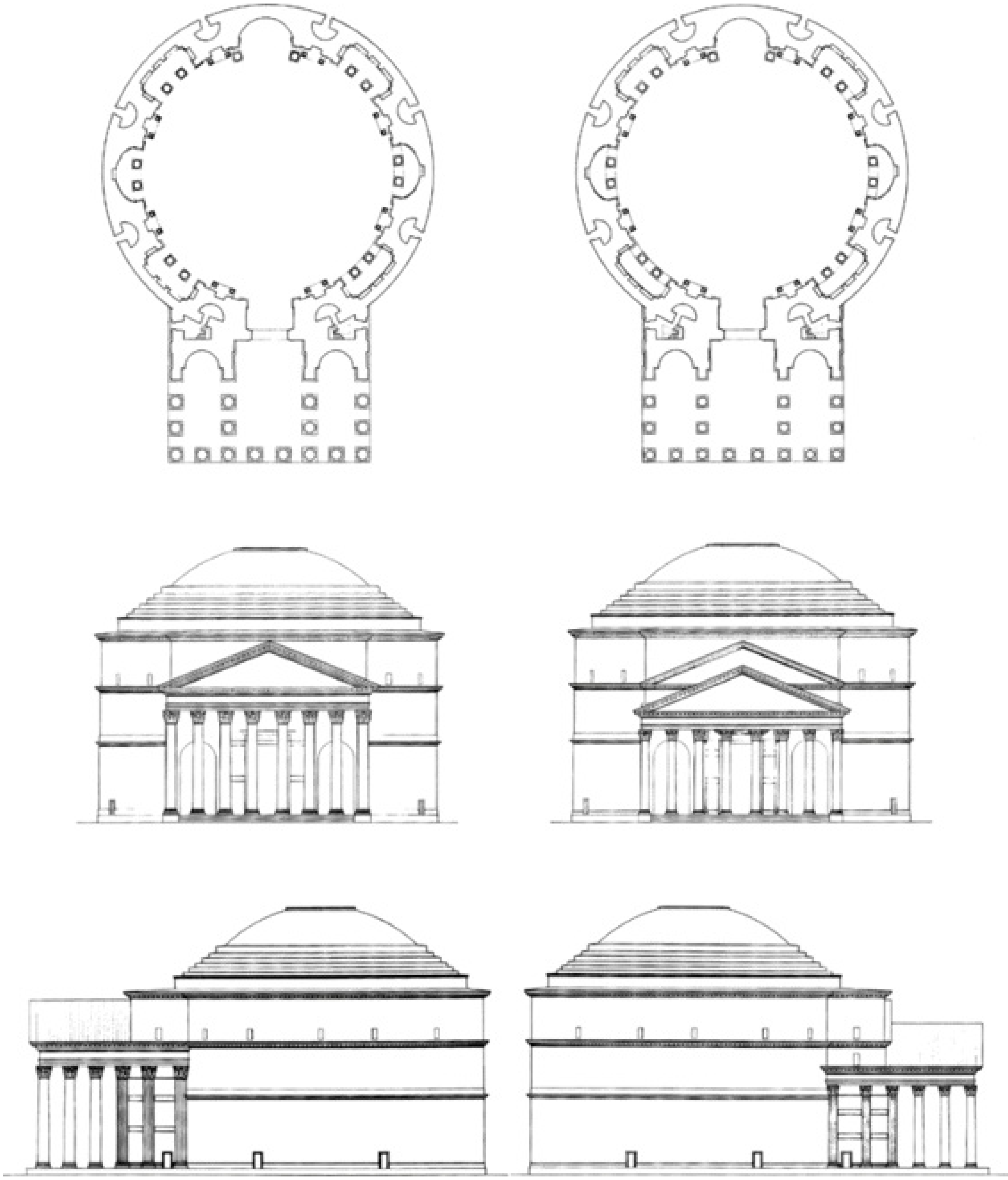
provoked just as varied responses. Alternating between praise and criticism, the paradoxical *fortuna* of the monument has been charted lucidly by Tilmann Buddensieg,[31] while surfacing in the Introduction to this book, and in some chapters in the second half. Criticism of the interior was mainly directed at the attic level, and especially the pilasters for being too small and for not aligning with either the main order below or the coffering above. This can be understood as a misplaced faith in academicism, which tended to dominate from the time of the Renaissance, and in particular the "law" of vertically aligning like with like. Instead, we may delight in a coherent scheme that spurns a predictable radial solution for the sake of a genuinely dynamic experience. The "push and pull" effect of the openings and exedras on the eight main axes is accentuated by compositional alignments avoided elsewhere.[32] (The proof that all of this was deliberate lies in the way the floor pattern meets the rotunda, being similarly synchronized exclusively on the eight main axes.) Because it is not so obviously tied visually to the drum, the dome appears to hover with an indefinable magical quality.[33]

Criticism of the exterior has concerned the difficult marriage of the rotunda, transitional, block and portico, as exemplified by the abrupt termination of the entablature where the circular and orthogonal geometries meet (Figs. 7.9, and 7.11, and see Fig. 1.9). Along with various "solecisms" – offenses to the classical "grammar" of the orders – this lack of unity used to be seen as the legacy of separate phases. Giorgio Vasari related how many artists of his time, "Michelangelo among them, are of the opinion that the Rotunda was built by three architects, the first carrying it up to the cornice above the columns, the second doing from the cornice upwards.... [T]he third is believed to have done the beautiful portico."[34] As late as the 1930s, Giuseppe Cozzo, a specialist of Roman construction who should have known better, continued to maintain that the rotunda was built first (in the time of Agrippa), and the rest later (in the reign of the Severan emperors).[35] This was an attempt to reconcile the main Agrippa inscription emblazoned on the frieze of the portico with the secondary longer inscription in smaller letters on the architrave.[36]

7.11. Junction of the rotunda, transitional block, and portico on the west side. (Photo Mark Wilson Jones)

But the enigma of the Pantheon is not to be solved in this way. Following the work of Georges Chedanne, Luca Beltrami, and Heinrich Dressel in the 1890s, scholars had to accept the implications of brickstamp studies (see Chapter Three). Leaving aside for a moment the precise dates implied, these showed that save for later repairs and alterations, the whole edifice was erected more or less in one go. What explains, then, the character of the design? The inept collision of rotunda, transitional block, and portico continued to elude a positive interpretation, representing something of an embarrassment to be sidestepped as deftly as possible by anyone writing about the Pantheon in the course of the twentieth century.[37]

Paul Davies, David Hemsoll, and I attempted an explanation of a quite different kind in 1987 arguing that the front of the Pantheon is not what was originally intended, but rather the outcome of compromises induced by circumstances beyond the architect's control. The "compromise hypothesis" proposes that the portico was originally planned to have a roof at the level of the existing upper pediment, a roof supported on columns incorporating monolithic shafts of Egyptian granite 50 feet in length and 100 tons in weight (Fig. 7.12, Plate XVII).[38] For some reason unknown – perhaps because a consignment of the intended shafts had sunk at sea en route between Alexandria and Rome – only after work had started on site was the decision made to employ 40-foot shafts instead.[39] It is important to note that Roman monolithic column shafts tended to be standardized in multiples of 4- and/or 5-foot lengths, and that they were typically worked up to near-finished form in major quarries across the Mediterranean world. Large examples can still be seen where they were abandoned in several quarries, including those of Mons Claudianus, the source of the shafts for the front file at the Pantheon. In the context of grand imperial monuments, 40 footers represented the next major step down from 50 feet, and it was this smaller size that was actually used. Forty footers were also much more common (and they weighed only half as much, though this was probably not the key factor).[40]



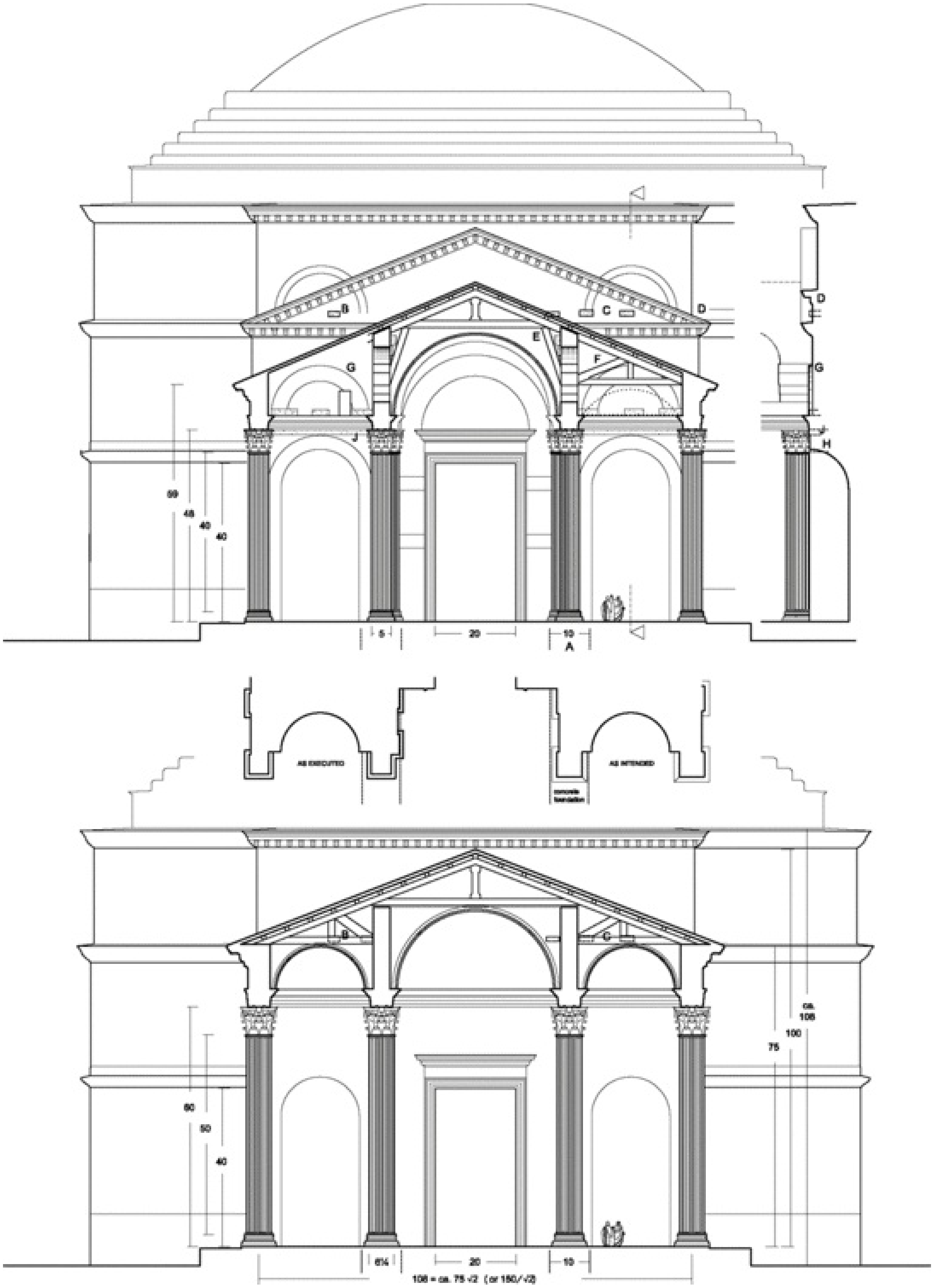
7.12. Pantheon plans and elevations, intended and as executed. (Wilson Jones 2000, Fig. 10.12)

Although it should perhaps not be admitted in the politely serious domain of scholarly discourse, our article of 1987 was conceived by chance in a London pub after a day studying other things in the Warburg Institute, while sketching from memory. But what started as a bit of speculative amusement came to take on substance upon further research. Calculation showed that 50-foot shafts were perfectly commensurate with an order rising to the cornice running around the rotunda and the start of the upper pediment. Meanwhile, scrutiny brought into focus the solecisms that had worried so many past commentators, while revealing some previously unnoticed ones. In effect, there is quite a tally of features that are sufficiently unusual or perverse as to raise the question of whether they were really intended in the first instance. Here follows the list of points as they stood in the year 2000:[41]

i. The transitional block is faced with an accessory pediment that is partially cut off by the main roof (Fig. 7.9). No known earlier building has a comparable arrangement save for the Propylaea of the Athenian Acropolis.

ii. The entablature of the portico terminates abruptly at the rotunda, failing to align with the moldings of the latter (Figs. 7.9, 7.11).
iii. The portico pediment is exceptionally tall in relation to the height of the order (Fig. 7.12, and see Plate I), to judge by the proportions of other Roman buildings of similar size, such as Augustus's temple of Mars Ultor.
iv. The cornice brackets or modillions of the portico pediment are smaller and are spaced at more frequent intervals than those of the upper pediment, despite the fact that both pediments are the same size (Fig. 7.9).
v. The gaps between the columns, or intercolumnations, are unusually large relative to the column diameter when compared with most other monumental imperial colonnades (although widely spaced rhythms did also exist).
vi. The antae in the portico are oddly unbalanced. The sides facing the great niches are wider than the rest, an arrangement that gave rise to an unsatisfactory resolution of the capitals overhead (Figs. 7.10, right; 7.13, partial plan)
vii. The central aisle of the portico becomes narrower where it enters the transitional block; here is a peculiar grouping of pilasters, as if the ones nearer to the entrance door were added after the others were already in place (Figs. 7.10, 7.14).
viii. Where the portico meets the transitional block the entablature steps out by a small amount, one neither so small as to be insignificant nor so big as to constitute a positive feature (Fig. 7.11).
ix. The transitional block is only bonded with the rotunda in the lower levels of the building. In the upper parts, it merely runs up against the rotunda, as has just been confirmed in the preceding discussion (see Fig. 1.9).

All such solecisms and curiosities would simply not have existed in the hypothetical original project (Plate XVII). Scholarly responses to the compromise hypothesis have been favorable, though of course not everyone is convinced.[42] Lothar Haselberger, the author of important publications on the building, hastaken issue with such an approach, highlighting the danger of presuming that we can know what ancient architects intended, along with specific objections to some of the points just outlined.[43] For him, the juxtaposition of exacting details with various “misfits” could reflect an approach to making buildings that we have yet to fully appreciate, in this as in other imperial monuments.[44] His is wise council, but yet the juxtapositions he notes (precise-imprecise, regular-irregular, and so on) seem to me not so much to detract as perhaps to *add* to the argument, for they remain easier to understand in a situation where a design had to be compromised, delayed, and possibly rushed as a consequence. In any event, not one of the previous points has been definitely disproved. And no one has yet been able to show how and why we should positively celebrate the front of the Pantheon in the same way as we certainly can the interior.



7.13. The portico as built (top) and as intended (bottom). Transverse section through the portico, with the transitional block and rotunda seen in elevation, 1: 400, with part-section top right and part-plans in the middle. (Drawing Mark Wilson Jones)

7.14. The vestibule and door, seen on axis with view through to the rotunda beyond. Originally a bronze, suspended, vaulted ceiling would have abutted the reveal of the masonry barrel vault over the vestibule. (Photo Maxim Atayants)

Other responses to the compromise hypothesis take the form of qualified support, such as that published by Rabun Taylor in his book *Roman Builders*; he runs with the idea of a compromised Pantheon portico, but adapts it in favor of hypothetical columns that were taller still.[45] Yet Taylor's 55-foot shaft size is not able to appeal to evidence of the same kind that favors 50 footers. One such is a letter on papyrus from an Egyptian contractor dating to Hadrian's reign. It calls urgently for fodder for animals involved in transporting overland a single 50-foot granite shaft from the quarries at Mons Claudianus to the Nile, and thence to Alexandria, from where it would in all certainty have

been bound for Rome.[46] Another coincidence concerns the working drawing template of the Pantheon pediment inscribed on the pavement in front of the Mausoleum of Augustus (see the Introduction). The pediment crosses over the plan of a capital that is too big for the actual building, but which freakily happens to be precisely the size that the hypothetical project predicts.[47] A much damaged 50-foot granite shaft lies under the sea off the ancient port of Alexandria, while the possibility of 50 footers arriving in Rome is underlined by the recent discovery of stumps in the imperial fora.[48] The find-spot points to their use in the focal cult building of the vast precinct known as the Temple of Peace, begun in the early 70s AD. This adds to the very rare instances of 50-foot monolithic shafts already known in the city: the broken one lying by Trajan's Column and companions under the nearby palazzo Valentini, which belonged to the Temple of Trajan, as well as the shaft of the Antonine column, which was also of Egyptian granite and extracted in the time of Trajan. Trajan's Baths is another candidate.[49] The quarrying, transportation to Rome, and erection of such 100-ton monster stones was thus a feasible imperial ambition, albeit one so audacious that it stretched the Roman building machine to the limit.[50]

It is possible to marshal further fresh evidence in favor of the compromise hypothesis. My inspection of the staircases has established once and for all that the rotunda and transitional block are united at low level, and so part of a unified project. The compromise hypothesis offers an explanation for the interruption of work on the transitional block; furthermore, it fits neatly with a hiatus of relatively short duration during which the design was argued over and revised.

It is also worth scrutinizing once more the relationship between the transitional block and the portico. While Colini and Gismondi's observations, discussed earlier, concerned the *actual portico*, certain constructional details fit a *hypothetical taller one*. The original sequence of nine numbered points embraced by the compromise hypothesis can now be extended with reference to a sectional elevation of the transitional block in both its actual and intended form (Fig. 7.13).[51]

x. The 10-foot-wide concrete strip foundations under the portico are unusually wide for the columns they carry, and would have been adequate for larger columns (Fig. 7.13, A).[52]

xi. At high level, the front face of the transitional block presents some unsightly projecting blocks (Fig. 7.13, B and C). These facilitated construction in some way or other, though exactly how rather baffled Colini and Gismondi. With a hypothetical taller portico, all such blocks would have been hidden from view between the suspended ceiling and the roof.

xii. The profile of the transitional block sets back where the cornice demarcates the high-level register, just as occurs on the rotunda (Fig. 7.13, D). This set-back follows the classical principle of recession, in tune with structural logic (walls high up in a building need not be as thick as those below). On the front of the transitional block, moreover, the set-back tracks the *upper* pediment, which was therefore an integral feature of the composition. This arrangement makes most sense if a roof had been planned to arrive here – that is, that of the hypothetical taller portico.[53] (Contrariwise, there is no such set-back at the level of the existing portico roof.)

xiii. The ancient bronze trusses that once spanned the portico displayed oddities of configuration, as is clear from surveys made before 1625, including one by Borromini at

the time this singular assembly was taken down (see Fig. 10.1).[54] In particular, the tie beams over the central aisle did not reach far enough to be seated over the colonnades, and were instead supported by raking struts (Fig. 7.13, E). As Louise Rice has observed, the design need not have been so complicated had the portico achieved its intended height.[55] The other puzzle she highlights is the lack of space in the side aisles for semicircular vaults; such a configuration would have conflicted with the trusses (Fig. 7.13, F), and so the ceilings here must have been either flatter than semicircular, or completely flat.[56] It is significant that the original project offers a majesty and simplicity entirely in tune with the rotunda and dome. The ideal portico could have accommodated semicircular barrel vaults for all three aisles, and not just over the central aisle.[57] Considering the impact of the one section of barrel vault that remains in place, the brick and concrete portion over the vestibule (Fig. 7.14), the effect of the original tripartite and even loftier arrangement would surely have been astounding. Crucially, the main aisle would have been spanned using simple trusses supported over the columns.

At the same time, the original design was consistent with the following advantages: a total height, measured to the peak of the pediment/roof would have been 100 feet (more or less), an eminently satisfying round dimension that echoed other key dimensions (e.g., the 150-foot diameter of the ring of interior columns, the 75-foot datum for the entablature and middle cornice of the rotunda, the 60-foot height of the columns, and the 50-foot height of their shafts). The relatively steep pitch of the pediment is now explained; this particular rake was a necessary ingredient for sweetly resolving these various conditions and intentions.

These last points, especially xi and xii, suggest that when work resumed on the transitional block, there was possibly still the intention to achieve the taller portico. But other features suit the actual portico, including the inclined line of bipedales just above the roof that Colini and Gismondi observed, and the embedded capital blocks already mentioned. As regards the latter, it is noticeable that these are not neatly encased in the masonry as would befit work made all of a piece; there is a slight gap to the sides that would be consistent with their having been lowered and levered into a seating that was fashioned at a later stage to the initial building of the masonry in this area.[58] Following the nonappearance of the desired 50-foot shafts, it seems that there was an uncertain phase when both options – to use 50 or 40 footers – were kept open pending a definitive decision.[59] The choice of the latter was probably put off until the last possible moment, inducing a hastiness that contributed to the messiness of the final outcome.

The compromise hypothesis, then, can potentially account for most, if not all, of the design puzzles that the Pantheon presents on its entrance side. It also concurs with the relative phasing of construction. But can we be more precise and pin down the specific dates involved?

Brickstamps

The practice of imprinting bricks and other Roman building products of fired clay with the identification marks of individual production units (*officinae*) and their parent brickyards (*figlinae*) happens to have been particularly prevalent in the years spanning Trajan's and Hadrian's rule.

Usefully, for study purposes these stamps can be dated either roughly or in some cases to a particular year.[60] This assigns any building in which they are found a *terminus post quem*; the building must have been erected after the bricks were made, although it is hard to say precisely how much later.[61]

On the basis of the prewar studies of Herbert Bloch and Julien Guey, no less than 115 of the 120 stamps observed in situ in the Pantheon belong to the late Trajanic or early Hadrianic period.[62] It is significant that similar stamps are dispersed in different parts of the building.[63] Thus, all of the brick and concrete parts must be roughly contemporary, including not only the grottoni but also the upper parts of the transitional block. This evidence confirms that the former was built quickly, and that the interruption of work on the latter was brief.

Establishing exactly when works on site began is controversial. As Lise Hetland shows in Chapter Three, the brickstamps that can be dated precisely, or relatively precisely, are mainly late Trajanic. Bloch argued that the Trajanic shipments were stockpiled, not to be taken up until Hadrian instigated the project after coming to power in the middle of 117. Exposing a certain circularity in Bloch's position, Hetland argues more straightforwardly that the project was Trajan's, in line with Wolf-Dieter Heilmeyer's ideas of the 1970s based on stylistic comparisons.[64] And is it not more logical, asks Hetland, that Trajan commissioned a replacement Pantheon sooner rather than later after the fire of 110 that ruined its predecessor? In short, a start date between 112 and 115 is more likely than one around 118.

The key consideration for the end date is that in AD 123, a higher than usual proportion of bipedales were produced bearing brickstamps, often with the names of the then-reigning consuls Apronianus and Paetinus. The absence of such stamps in the superstructure of the Pantheon shows that it must have been completed by this time or soon after, in other words by around 124.

It is revelatory to focus on a single stamp that does not fit the general pattern. This is the sole example from the whole building that is unambiguously Hadrianic, one recorded by Rodolfo Lanciani and datable to AD 123. Bloch was struck by the anomalous character of this find, in effect adding another enigma to the building that Lanciani called the "Sphinx of the Campus Martius." Bloch knew that the rigors of his discipline were unassailable; no structure can be earlier than the latest stamp present (provided it is not connected with out-of-sequence working or repairs). Having been found close to ground level, did not this one stamp postpone the start of construction to later than 123? Bloch resolved this dilemma by supposing that Lanciani had simply been mistaken.[65]

Lanciani's record, however, sounds as if it were accurate: "read by myself on the 25th of April on a piece [*scaglia*] of brick extracted from a sounding made by the north east corner of the brick front, behind the marble pilaster."[66] Rather than doubt his word, there is a way of reconciling it with the evidence of all the other brickstamps. The key is the find-spot, just behind one of the marble pilasters, that is to say exactly where the columnar system of the portico meets the transitional block. In all likelihood, Lanciani's *scaglia* would have formed part of fill material that accompanied the positioning of the pilasters and the erection of the columns.[67] Given that the portico could have been put up relatively rapidly (thanks to the prefabricated bases, shafts, and capitals), this evidence suits the dedication of the new Pantheon sometime between 125 and 127. Since Hadrian returned to Rome in the summer of 125 after his first tour of the empire,[68] it is tempting to assume that he would have presided over the ceremonies in person.

The Progress of Works on Site

There are thus two main possibilities for the duration of the project from conception to completion: either a period of seven or so years (ca. 118/119 to ca. 125/126), if we give credence to Bloch, or one roughly five years longer (ca. 113/114 to ca. 125/126), if we give credence to Heilmeyer and Hetland, which on balance I think we must. It may also be noted that the papyrus cited earlier that concerns a 50-foot shaft in transit across the eastern Egyptian desert dates to the third year of Hadrian's reign, specifically the winter months of 119/120.[69] If the shaft were indeed intended for the Pantheon, the timing seems too early for a Hadrianic commission; on the other hand, it fits neatly with a start under Trajan.[70]

In the normal course of events, as DeLaine demonstrates in Chapter Six, a total construction period of six or seven years would be feasible for the Pantheon. But from what we have seen, events at the site were far from normal. Delays were generated by the improvised erection of the grottoni. Delays are also implicit in the interruption of the transitional block caused by the nonappearance of the intended shafts for the portico. (It remains difficult to say whether these delays ran separately or concurrently.)

The combined evidence of the sources, brickstamps, worksite logistics, and the present examination of the fabric thus allows the sequence of operations and chronology of the project to be reconstructed as shown in Plate XIII, which is to say along the following lines:

110	Previous Pantheon burns	Trajan reigns
112–114	Conception of the new Pantheon; scheme design	
114–116	Site preparation and foundations	
116–119	Progress on brick and concrete superstructure	(117) Hadrian's accession
118–121	Rotunda suffers cracking; progress interrupted; improvisation of the grottoni; nonappearance of 50-foot shafts for the portico	(118) Hadrian returns to Rome
120–123	Grottoni completed; work begins on the dome; work on the transitional block interrupted	(121) Hadrian leaves Rome
122–124	Completion of the dome; completion of the transitional block; decision to use 40-foot shafts for the portico	
124–	Completion of the portico; installation of statuary and fittings;	(125) Hadrian

125	finishing and inspections	returns
125–127	Dedication of the Pantheon	
128		Hadrian leaves Rome

Apollodorus and Hadrian

Inception under Trajan as opposed to Hadrian makes it more likely that the Pantheon was designed by the architect-engineer Apollodorus of Damascus, who was Trajan's preferred designer but apparently at odds with Hadrian. Certainly Apollodorus is the more credible author of the Pantheon than Hadrian himself, who has also been proposed.[71] As we have seen in the Introduction, ancient sources credit Apollodorus with Trajan's Forum and Baths, both quite exceptional projects.[72] Attribution of the Pantheon to him, too, makes sense on several levels. There are shared stylistic traits in the marble decoration of the Pantheon and Apollodorus's Forum of Trajan.[73] The open-air half rotundas of Trajan's Baths offer points of similarity with the Pantheon rotunda in respect of both proportions (see Chapter Five), and the form of coffering (see Figs. 5.2, 5.3). It is especially significant that in elevation, these spaces present a comparable syncopation to that manifest inside the Pantheon. In two out of three of the surviving exedras in the Baths, the niches in the walls are synchronized with the coffers of the vault on the main and diagonal axes, but nowhere else.[74] As a result of the present study, it is possible to identify further parallels between both projects as regards staircases. The unusual trapezoidal configuration of the Pantheon stairs is in fact closely anticipated in the staircases behind the half rotundas of the Baths (see Fig. 5.2). Individual flights of stairs also share constructional similarities, for example, in the disposition of bipedales.

It is well, furthermore, to recall discussion about the centering used to build the dome. This would have been a considerable work of engineering in its own right, and Apollodorus was evidently a master architect-engineer with extensive expertise in the erection of giant timber structures, as attested by his authorship of the *Poliorcetica*. Ancient sources also credit him with a pertinent technological feat, a huge wooden bridge over the Danube, which apparently approached 170 Roman feet or 55 meters in span (though probably less in reality). This sensational structure, which is represented in compact form on Trajan's Column, was destroyed on Hadrian's orders out of fear that it would provide a conduit for barbarian invasion. (Some of its stone and concrete piers still survive.)[75] The bridge was the subject of another treatise by Apollodorus, a work which, though since lost, was referred to by the sixth-century historian Procopius in such a way as to suggest that it was still well known in his own day.[76] Apollodorus, then, was in a singularly good position to have mastered the erection of large timber superstructures, and so too the centering of the Pantheon's dome. Against the background of the prevalently anonymous history of Roman architectural practice, this completes as good a case for attribution as can ever be made for an architect of the period on the basis of design approach and circumstantial evidence.

It is curious, too, that the persons of Apollodorus and Hadrian come into conflict, according to the

testimony of the third-century senator and historian Dio Cassius.[77] Apparently, the emperor first banished and later put to death the architect on account of bad feeling that began long before, when Trajan was consulting Apollodorus, who tactlessly put down one of Hadrian's interruptions with the remark: "be off and draw your pumpkins, you don't understand any of these matters." Later, after becoming emperor, Hadrian sent his own design of the Temple of Venus and Rome to Apollodorus, only to receive intolerable criticisms. The divine statues had been made too tall for the height of the cella, so much so that "if the goddesses wish to get up and go out, they will be unable to do so."

The disparaging reference to pumpkins, or gourds, was most likely an allusion to the scalloped vaults that Hadrian and his architects used to such effect at his villa at Tivoli.[78] It is tempting to wonder if the story about the Temple of Venus and Rome was a corruption of a text in which the Pantheon was the real focus of dispute.[79] Dio could hardly have endorsed this possibility since, after all, presumably on the basis of the inscription on the portico, he believed the Pantheon to have been built by Agrippa, as is clear from a passage discussed in Chapter Two. Bad feeling between Apollodorus and Hadrian may have been further fueled by the demise of the former's bridge on the latter's orders. Be that as it may, the fact is that Dio reports antagonism between the two men, and rivalry that revolved around contrasting approaches to design. If there were even a kernel of truth to this, and if Apollodorus were indeed the designer of the Pantheon as I argue he was, it is easy to imagine the two men taking up opposing positions over this project and how to resolve the misfortune that had befallen it.

Presumably, Apollodorus held out for the taller portico and its majestic 50-foot shafts, while the emperor sought to prevent further embarrassing delays by resorting to compromise. From his knowledge of Athens, Hadrian may have been aware that the Propylaea of the Acropolis had two separate pedimented roofs, and that when seen from a distance, one might look as if it were superimposed on the other. Was it he who imposed the double pediment solution, while commandeering a batch of 40-foot columns from another project under way in the capital?

Leaving aside such conjecture, the building site of the Pantheon was eventful, to say the least. Improvisation at the south end suggests that the dome was thought to be in jeopardy. Then there was the dilemma caused by the nonappearance of the intended column shafts at the north end. The architect, whoever he was, no doubt had to shoulder the consequences and perhaps the blame for them, too, even if unfairly so. Remembering all the while that design represents a team effort, the architect(s) of the Pantheon can stake a claim to one of the most sublime architectural experiences of all time. As the product of a rare genius and extraordinary technical audacity, it must have given its author immense satisfaction, yet by this interpretation, the building of it was harrowing in its uncertainty and immensely frustrating. The awesome magnificence of the interior should have been matched on the exterior, but instead the designer saw his vision spoiled. Much of his efforts must have been directed at artfully minimizing the negative impact of circumstances that could not be avoided. But compromise is part and parcel of an architect's business. Building the Pantheon was a dream that turned nightmarish, though in the end it sends all who enter into reveries.

1 The diameter of the Temple of Diana, part of a thermal complex, is fractionally greater than 29.5 meters, or 100 Roman feet. The so-called Temple of Apollo, also at Baiae, apparently measures

about 35 meters (ca. 120 ft) in diameter, but too little is known about this structure to be sure that it once supported a dome. In Rome, the caldarium of the Baths of Caracalla, originally domed, spanned about 35 meters too.

2 Selected studies of imperial construction include G. Lugli, *La tecnica edilizia romana*, Rome 1957; William L. MacDonald, *The Architecture of the Roman Empire, vol. 1: An Introductory Study*, London 1965, 2nd ed. rev. New Haven 1982; M. E. Blake, *Roman Construction in Italy from Nerva through the Antonines*, Philadelphia 1973; Jean-Pierre Adam, *La construction romaine. Matériaux et techniques*, Paris 1984, translated as *Roman Building: Materials and Techniques*, Bloomington 1994; F. C. Giuliani, *L'edilizia nell'antichità*, Rome 1990; Janet DeLaine, *The Baths of Caracalla in Rome: A Study in the Design, Construction, and Economics of Large-Scale Building Projects in Imperial Rome (Journal of Roman Archaeology,* Supplement 25*)*, Portsmouth, RI, 1997; Larry F. Ball, *The Domus Aurea and the Roman Architecture Revolution*, Cambridge 2003; Rabun Taylor, *Roman Builders*, Cambridge 2003; Lynne Lancaster, *Concrete Vaulted Construction in Imperial Rome: Innovation in Context*, Cambridge 2005.

3 Lynne Lancaster, "The Lightweight Volcanic Scoria in the Concrete Vaults of Imperial Rome: Some Evidence for the Trade and Economy of Building Materials," *Proceedings of the XVIth International Congress of Classical Archaeology*, Boston, 2003: pp. 212–216. Cf. Lancaster 2005, p. 64. Pumice is used in general literature to refer to both red-to-brown scoria of the type used in the Pantheon (750–850 kg/m^3) and dark-light gray pumice (600–700 kg/m^3), which tended to be used in the late third and fourth centuries.

4 Alberto Terenzio, "La Restauration du Panthéon de Rome," *Museion* 20, 1932, pp. 52–57; on p. 52 he promised a detailed publication of his findings relating to the restoration works of 1930–1931, but this resource remains unpublished.

5 Rowland J. Mainstone, *Development in Structural Form*, London 1975, pp. 116–117; Robert Mark and Paul Hutchinson, "The Structure of the Roman Pantheon," *Art Bulletin* 78, 1986, pp. 24–34; Robert Mark, *Light, Wind, and Structure*, Cambridge 1990, p. 60 ff.; David Moore, *The Roman Pantheon: The Triumph of Concrete*, Wyoming 1995, p. 2; Jacques Heyman, "Poleni's Problem," *Proceedings of the Institution of Civil Engineers* 1, no. 84, 1988, pp. 737–759.

6 Giorgio Croci, *The Conservation and Structural Restoration of Architectural Heritage*, Boston 1998, p. 125; Croci, "Il comportamento strutturale del Pantheon," in Giovanni Belardi, *Il Pantheon: storia, tecnica, e restauro*, Viterbo 2006, pp. 263–310, esp. 266–267, 282–283, 285–287. Cf. Kjeld De Fine Licht, *The Rotunda in Rome: A Study of Hadrian's Pantheon*, Copenhagen 1968, pp. 89–93.

7 Differential settlement affected Agrippa's Pantheon to a greater extent, to judge by sloping levels observable in the foundations that survive under the portico of the existing building; see Chapter Two.

8 That the cracking occurred during or soon after construction is suggested by the use of bricks of similar date to those in the rest of the Pantheon for repairing and filling the cracks; see Licht 1968, p. 288, n. 40. Giuseppe Cozzo (*Ingegneria Romana: maestranze romane; strutture preromane, strutture romane, le costruzioni dell'anfiteatro flavio, del Pantheon, dell'emissario del Fucino*, Rome 1928) made much of the structural problems affecting the southern sector of the rotunda, although his interpretation is fantastical. Alberto Terenzio, s.v. "Pantheon," *Enciclopedia Italiana* 26, 1949, pp. 212–214; p. 213 uses the term *accidentata* to characterize the progress of the works; cf. Terenzio 1932, p. 54. See also Moore 1995, 11–13.

9 On Roman concrete, see Adam 1984 (1994 translation), pp. 73–79, 177–91; Heinz-Otto Lamprecht, *Opus Caementitium. Bautechnik der Römer*, Düsseldorf 1987; Moore 1995; G. R. H. Wright, *Ancient Building Technology,* vol. 2: *Materials*, part 1, Boston 2005, Chap. 6; Lancaster 2005, esp. Chap. 3.

10 S. Huerta, *Arcos, bóvedas y cúpulas. Geometria y equilibrio en el cálculo tradicional de estructuras de fábrica*, Madrid 2004.

11 William L. MacDonald, *The Pantheon: Design, Meaning, and Progeny*, London 1976, p. 38.

12 Eugène-Emmanuel Viollet-le-Duc, s.v. "Voute," *Dictionnaire raisonné de l'architecture française du XIe au XVIe siècle*, vol. 9, Paris 1875, pp. 471–474, with Fig. B on p. 475; Taylor 2003, pp. 194–211; cf. Adam 1984, Fig. 443. Taylor assigns a major role to ropes, but these would stretch variably according to humidity and temperature and so perhaps not be capable of providing dimensional stability.

13 I thank Dina D'Ayala for generously lending her engineering expertise to vet initial proposals.

14 The structural behavior is composite in nature, meaning that part of the load was resisted by the lower part of the dome (once the concrete had hardened sufficiently).

15 For opinion favoring some kind of central timber tower, see Jürgen Rasch, "Zur Konstruktion spätantiker Kuppeln vom 3 bis 6 Jahrhundert," *Jahrbuch des deutsches Archäologischen Instituts* 106, 1991, pp. 311–383; pp. 369–370; Gerd Heene, *Baustelle Pantheon: Plannung, Konstruktion, Logistik*, Düsseldorf 2004; Lancaster 2005, pp. 44–45.

16 Adriano La Regina, ed., *L'arte dell'assedio di Apollodoro di Damasco*, Rome 1999.

17 Relieving arches could provide support for higher levels to be initiated without the fabric of the

walls enclosed by the arches, this following on later, as convenient. For further discussion, see Heene 2004; Lancaster 2005, pp. 94–95; and Chapter Four in this volume.

18 Terenzio 1932, 54; J. Guey, "Devrai-on dire: Le Panthéon de Septime Sévère? A propos des estampilles sur briques recueillies dans ce monument, notamment en 1930 ou en 1931 et depuis," *Mélanges d'Archéologie et d'Histoire* (Ecole Française de Rome) 53, 1936, pp. 198–249; p. 237, n.5. For the complex as a whole, see Licht 1968, 157–171. For a proposal that the *grottoni* could have been used as archival storage, see Amanda Claridge, "Hadrian's Lost Temple of Trajan," *Journal of Roman Archaeology* 20, 2007, esp. p. 79.

19 Licht 1968, p. 163, Fig. 179.

20 Cozzo 1928, pp. 283–285.

21 Rita Volpe, "Un antico giornale di cantiere delle terme di Traiano," *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung* 109, 2002, pp. 377–394.

22 Today the crack may be inspected on the second level of the grottoni. Its presence at floor level, though now covered over, is attested by photographs, including one in the Archivio Fotografico, Soprintendenza per i Beni Architettonici e per il Paesaggio di Roma, neg. 2967.

23 For a reasoned summary of preceding opinion, see Licht 1968, pp. 85–88.

24 For Leclère's survey, see *Roma antiqua. "Envois" degli architetti francesi (1786–1901), Grandi edifici pubblici*, exhib. cat., Rome 1992, pp. 100–123.

25 I am grateful to many for their kind help with this project: to Giovanni Belardi, the director responsible for the Pantheon of the Soprintendenza per i Beni Architettonici e per il Paesaggio di Roma, for permission; to Cinzia Conti and her students Roberta Zaccara, Tomaso De Pasquale, and Mariangela Perrota for surveying; to Robert Grover for drawing up the results; to Cinzia Conti and Giangiacomo Martines for precious observations in loco.

26 Here, I find myself conscious of a debt to Giovanni Belardi for authorization to study the stairs, yet we disagree over interpretation. He believes the rotunda to precede the transitional block, but to me, the *saggio* disproves this.

27 Such is the similarity in technique between the upper and lower halves of the staircase in general

that their construction may have been supervised by the same people, as remarked to me by Cinzia Conti.

28 Antonio Maria Colini and Italo Gismondi, "Contributo allo studio del Pantheon: La parte frontale dell'avancorpo e la data del portico," *Bullettino della Commissione Archeologica Comunale di Roma* 44, 1926, pp. 67–92; especially 83, 87–92; they did not, however, set out sufficient evidence to resolve the question definitively. Luca Beltrami, *Il Pantheon: La struttura organica della cupola e del sottostante tamburo, le fondazioni della rotonda, dell' avancorpo, e del portico, avanzi degli edifici anteriori alle costruzioni adrianee. Relazione delle indagini eseguite dal R. Ministero della Pubblica Istruzione negli anni 1892–83, coi rilievi e disegni dell' architetto Pier Olinto Armanini*, Milan 1898, pp. 41–46; Cozzo 1928, pp. 281–282, Fig. 192; Licht 1968, pp. 59–63, 189; Mark Wilson Jones, "The Pantheon and the Phasing of its Construction," in Gerd Grasshoff, Michael Heinzelmann, and Markus Wäfler, eds., *The Pantheon in Rome: Contributions to the Conference, Bern, November 9–12, 2006*, Bern 2009, pp. 69–87, Fig. 13.

29 Colini and Gismondi 1926, pp. 70–73. Leclère's earlier inspections had led him to conclude that the transitional block cannot have been added in a separate phase, and in particular that there did not exist an earlier Pantheon with its front formed by the *avancorpo* alone, as Carlo Fontana had proposed. If Fontana were right, the horizontal cornice of the upper pediment would once have continued right across the face of the building, but there is no sign of such.

30 Colini and Gismondi 1926, pp. 75–77. Colini speculated that the inclined bipedales would originally have projected slightly beyond the face of the wall so as to resist rainwater ingress at the junction with the roof. Unfortunately, the area where these bipedales would be was covered by a metal flashing during the refurbishment of the roof covering in the autumn of 2010 before my own visit.

31 Tilmann Buddensieg, "Criticism and Praise of the Pantheon in the Middle Ages and the Renaissance," *Classical Influences on European Culture A.D. 500–1500: Proceedings of an International Conference Held at Kings College, Cambridge, April 1969*, ed. R. R. Bolgar, Cambridge 1971, pp. 259–267; Paul Davies, David Hemsoll, and Mark Wilson Jones, "The Pantheon: Triumph of Rome or Triumph of Compromise?" *Art History*, 10, 1987, pp. 133–153; Tod A. Marder, "Bernini and Alexander VII: Criticism and Praise of the Pantheon in the Seventeenth Century," *Art Bulletin* 71, 1989 pp. 628–645; Susanna Pasquali, *Il Pantheon: architettura e antiquaria nel Settecento a Roma*, Modena, 1996, Chaps. 5 and 6; Mark Wilson Jones, *Principles of Roman Architecture*, New Haven 2000, pp. 187–191, 199–202.

32 Wilson Jones 2000, pp. 191–196.

33 Heinz Kähler, "Das Pantheon in Rom," *Meilensteine europäischer Kunst*, ed. E. Steingräber,

Munich 1965, pp. 45–75; pp. 58–65; Marder 1989; William C. Loerke, “A Rereading of the Interior Elevation of Hadrian’s Rotunda,” *Journal of the Society of Architectural Historians* 49, 1990, pp. 32–43, esp. p. 30 ff.; Wilson Jones 2000, pp. 191–196. Cf. MacDonald 1976, pp. 70–72.

34 Adapted from Giorgio Vasari, *The Lives of the Painters, Sculptors, and Architects*, Florence 1550, trans. A. B. Hinds, repr. London 1963, pp. 275–276. A seventeenth-century source (Cod.Barb.Lat. 4309, f.11v) also attributed to Michelangelo the judgment that the first of the three phases was so good as to be “the product of angels,” which implies that the other phases were not so good. Cf. Buddensieg 1971, p. 265.

35 Cozzo 1928. For a critique of Cozzo’s theories in relation to brickstamps, see Herbert Bloch, “I bolli laterizi e la storia edilizia romana,” *Bullettino della Commissione Archeologica Comunale di Roma* 64, 1937–1938; Bloch, *I bolli laterizi e la storia edilizia romana. Contributi all’archeologia e alla storia romana (1936–1938)*, Rome 1947. A variant of Cozzo’s (and Carlo Fea’s) ideas on the Pantheon continues to be championed in Giovanni Belardi 2006. Gene Waddell (*Creating the Pantheon: Design, Materials, and Construction*, Rome 2008, esp. pp. 124–138, 149–150) advocates a substantial Severan restoration of the portico, but too substantial in my view.

36 On these inscriptions and their interpretation, see Adam Ziolkowski, “Prolegomena to Any Future Methaphysics [*sic*] on Agrippa’s Pantheon,” in *“Res bene gestae”: Ricerche di storia urbana su Roma antica in onore di Eva Margareta Steinby*, ed. A. Leone, D. Palombi, and S. Walker, Rome 2007, pp. 465–475, esp. 466–468; Ziolkowski, “What Did Agrippa’s Pantheon Look Like? New Answers to an Old Question,” in Grasshoff, Heinzelmann, and Wäfler 2009, pp. 29–39, esp. 38–39; C. Simpson, “The Pantheon’s Inscription, CIL 6.896: Its Date of Composition, Cultural Context, and ‘Message,’” *Athenaeum* 97, 2009, pp. 149–157; Mary T. Boatwright, “Hadrian and the Agrippa Inscription of the Pantheon,” *Hadrian: Art, Politics and Economy*, ed. Thorsten Opper, *British Museum Research Publications* 175, London 2013, pp. 19–30.

37 It has been pointed out, for example, that that even if the junction of rotunda and portico might be judged unsatisfactory, this could not be seen in antiquity from the forum-like “forecourt,” not forgetting that the ground level was at least two meters lower than at present. See MacDonald 1982, pp. 111–113; cf. Wilson Jones 2000, p. 202.

38 The key proportional rule for the Corinthian order set the height of the shaft as 5/6 that of the complete column (including base and capital), and so 50-foot shafts imply columns 60 feet tall; both dimensions harmonize well with 75- and 150-foot measures elsewhere in the whole project. For the design of the Corinthian column, see Wilson Jones, “Designing the Roman Corinthian Order,” *Journal of Roman Archaeology* 2, 1989, pp. 35–69; Wilson Jones 2000, Chap. 7.

39 Davies, Hemsoll, and Wilson Jones 1987; Wilson Jones 2000, Ch. 10. For shipwrecked cargoes

of ancient marbles see P. Pensabene, Il fenomeno del marmo nel mondo romano, in *I marmi colorati della Roma imperiale*, Rome 2002, pp. 3–67, esp. 34–46. Alternatively, Claridge (2007, p. 94) advances a plausible scenario by which the 50-foot shafts were diverted to the Temple of Trajan. Supplies of such huge stones were evidently inadequate for both projects within acceptable timescales.

40 Wilson Jones 2000, p. 148, p. 155, and Appendix B; Pensabene 2002, pp. 24–25; Paolo Barresi, "Il ruolo delle colonne nel costo degli edifici pubblici," in *I marmi colorati della Roma imperiale*, ed. Marilda De Nuccio and Lucrezia Ungaro, Rome 2002, pp. 69–81. This last study puts emphasis on multiples of 4 ft. It is true that the popular sizes of 16, 20, 24, and 40 ft are multiples of 4 ft, but since 20 and 40 ft are multiples of 5 ft as well, and since 5 ft also divides into the other popular sizes of 15, 25, 30, and 50 ft, it is best to speak of multiples of 4 and/or 5 ft, with 5 ft being the dominant of the two.

41 Wilson Jones 2000, p. 203.

42 Theodore Peña, "P. Giss. 69: Evidence for the Supplying of Stone Transport Operations in Roman Egypt and the Production of Fifty-Foot Monolithic Column Shafts," *Journal of Roman Archaeology* 2, 1989, pp. 126–132, esp. p. 131; Richard Tomlinson, *From Mycenae to Constantinople. The Evolution of the Ancient City*, London 1992, p. 163; Jürgen J. Rasch, *Das Mausoleum bei Tor de' Schiavi in Rom*, Mainz 1993, p. 54, n. 331; Edmund Thomas, "The Architectural History of the Pantheon in Rome from Agrippa to Septimus Severus via Hadrian," *Hephaistos* 15, 1997, pp. 163–186; esp. 179–180; Adam Ziolkowski, s.v. "Pantheon" in E. M. Steinby, *Lexicon Topographicum Urbis Romae*, 5 vols., 1995–1999; vol. 4, 1999, p. 58; Fikret Yegül, review of Wilson Jones 2000, *Journal of the Society of Architectural Historians* 60, 2001, pp. 500–504; Paolo Barresi, review of Wilson Jones 2000, *Archeologia Classica* 53, 2002, pp. 593–598; James Packer, review of Wilson Jones 2000, *American Journal of Archaeology* 106, no. 2, 2002, pp. 344–345; Thomas N. Howe, review of Wilson Jones 2000, *Bryn Mawr Classical Review*, April 15, 2002, pp. 469–472, http://ccat.sas.upenn.edu/bmcr/; Alessandro Viscogliosi, "Il Pantheon e Apollodoro di Damasco," *Tra Damasco e Roma: L'architettura di Apollodoro nella cultura classica,* ed. Festa Farina et al., Rome 2001, pp. 156–161, esp. p. 159; Taylor 2003, pp. 129–132; Rabun Taylor, "Hadrian's Serapeum in Rome," *American Journal of Archaeology* 108, 2004, pp. 223–266, esp. 244–254 (with a different proposal for the cause); Heene 2004; Eugenio La Rocca, "Templum Traiani et columna cochlis," *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung* 111, 2004, pp. 193–238; p. 211. Waddell (2008, esp. p. 135) accepts the change of column size, but thinks settlement prompted a Severan rebuilding of the portico. For a more neutral reception (noting the hypothesis with caution), see Martin Maischberger, *Marmor in Rom*, Ph.D. diss., Freie Universität, Berlin 1997, pp. 145–146; and for concerns regarding the composition of the building that bear indirectly on this problem, see P. Gros, *L'Architecture Romain, du début du III siècle av J.-C. à la fin du Haut Empire,* vol. 1: *Les monuments publics*, Paris 1996, pp. 175–176. For outright hostility, see C. Tiberi, "Saggio introduttivo," in G. Ortolani, *Il padiglione di Afrodite Cnidia a Villa Adriana: Progetto e significato*, Rome 1998, pp. 9–16, esp. p. 14. Belardi (2006) advances completely different explanations for the anomalies of the Pantheon.

43 In November 2006, Haselberger presented objections at the conference at the Karman Center in Bern that may be summarized as follows:

- The Propylaea of the Athenian Acropolis offer a precedent for the upper pediment (as Tiberi observed), which thus could have been intended from the outset (cf. my point i);
- Other buildings exist with similarly tall/heavy pediments (iii);
- The spacing of the modillions varies considerably, and so on this basis, it is hard to sustain arguments about intentions (iv);
- Other buildings exist with similarly wide intercolumnations (v);
- A capital inside the rotunda is not axially aligned with its pilaster, and so similar misalignments in the portico need not reflect a change of project (vi).

I concede that points iii, iv, and v are relatively subjective, and that they cannot furnish conclusive arguments either way. Point i calls into question a major plank of the compromise hypothesis, yet it does not necessarily negate it, since the idea of a second pediment, perhaps inspired by the Athenian Propylaea, may only have arisen *after* the Pantheon project ran into problems. As for the misalignment of the capitals (vi), there is a difference between an isolated case in the interior and the systematic occurrence of a more severe misalignment on all four antae in the portico. In short, none of these criticisms is fatal, while the other points (ii, vii, viii, ix) remain unchallenged.

44 Lothar Haselberger, "The Pantheon: Nagging Questions to No End," in Grasshoff, Heinzelmann and Wäfler 2009, pp. 171–186. In this article, he includes most but not all of the arguments presented at Bern and covered in the preceding note. I stand corrected in stating that as regards the double pediment, "no ancient building copies this arrangement." The Temple of Zeus Asklepios in Pergamon, built during the 120s–130s AD on the model of the Pantheon, did adopt a comparable solution, albeit better resolved; see O. Ziegenaus, *Das Asklepieion*, Altertümer von Pergamon XI,3, Berlin 1981, Taf. 85.

45 Taylor 2003, pp. 129–131, and 2004, esp. pp. 244–251. Taylor's portico implies a floor level lower than that of the existing portico. Yet the top of the concrete strip foundations lies above the bottom of his hypothetical column bases, rendering them improbable; see Beltrami 1898, Fig. xi.

46 Peña 1989.

47 Wilson Jones 2000, pp. 206–207; cf. Lothar Haselberger, "Ein Giebelriss der Vorhalle des Pantheon. Die Werkrisse vor dem Augustusmausoleum," *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung* 101, 1994, pp. 279–308. Although less likely, it is possible that this design was for the Temple of Trajan or the Temple of Venus and Rome, both of which had 50-foot shafts (the former monolithic, the latter not). Cf. Carlo Inglese, *Progetti sulla pietra: Strumenti del Dottorato di Ricerca in Rilievo e Rappresentazione dell'Architettura e*

dell'Ambiente, vol. 3, Rome 2000, pp. 47–50. It should be noted, however, that an Augustan date for the paving and drawing is hypothetically possible.

48 Stefania Fogagnolo, "Scoperta di frammenti di colonne colossali dal foro della pace," in *I marmi colorati della Roma imperiale*, ed. Marilda De Nuccio and Lucrezia Ungaro, Rome 2002, pp. 136–137; La Rocca 2004, p. 209, n.56.

49 For a list of 50 footers, see Peña 1989, p. 130. For the Temple of Trajan, see James Packer, *The Forum of Trajan in Rome: A Study of the Monuments*, Berkeley 1997, p. 457 ff. See also R. Meneghini, "Il foro Traiano. Ricostruzione architettonica e analisi strutturale," *Römische Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung* 108, 2001, pp. 245–268; and see La Rocca 2004, pp. 208–212, for the theory that the shafts belonged instead to a monumental gateway, countered by Claridge 2007, with further detail on the shafts on pp. 63–66. For the Antonine Column, see J. B. Ward-Perkins, *Marble Antiquity: Collected Papers of J. B. Ward Perkins*, ed. H. Dodge and J. B. Ward-Perkins, Rome 1992. For the shafts of Trajan's Baths, see La Rocca 2004, pp. 209–210, Fig. 10, with further references. I have not myself located on site anything bigger than pieces commensurate with 40 footers; however, Rita Volpe has measured fragments she judges consistent with 50 footers, while Simone Gianolio in his forthcoming doctoral thesis uses evidence from standing walls to deduce their presence.

50 On standardization in the service of the Roman "building machine," see Wilson Jones 2000, p. 155.

51 This drawing is based on those of Leclère and Colini, supplemented by my measurements of the plan, and aspects of the main order that I was able to check from openings in the staircase. The trusses were reconstructed on the basis of Borromini's survey and sixteenth-century drawings. Further features were observed and photographed from nearby scaffolding in November 2010.

52 The 10-foot width of the foundations relates to the 5-foot column diameter as 2:1. By contrast, Vitruvius recommends a ratio of around 3:2 (1.5:1), a value more or less consistent with monumental imperial practice. The substructures under monumental colonnades typically project approximately in line with the plinths of the columns, implying a thickness about 1.4 times the column diameter. A ratio in the range of 1.4–1.5 recurs at the temples of Castor, of Vespasian, and of Antoninus and Faustina, as well as on the foundation blocks of travertine and peperino supporting colonnades in the Forum of Trajan. For a generic illustration of a concrete foundation only slightly wider than the plinths of the columns it supports, see Giuliani 1990, Fig. 5.3. In the intended portico, the ratio of foundations to column diameter would have been 1.6:1 (10:6¼), that is to say, still on the safe side.

53 The set-back could also have been intended to seat elements of the roof construction, as Gene Waddell has drawn to my attention.

54 For this drawing of Borromini, see Heinrich Thelen, *Francesco Borromini. Die Handzeichnungen*, vol. 1, Graz, 1967, cat. no. 25, pp. 32–33 (there is also a second drawing, cat. no. 26); Licht 1968, pp. 50–58; Louise Rice, "Urbano VIII e il dilemma del portico del Pantheon," *Bollettino d'arte* 143, 2008, pp. 93–110; Rice, "Bernini and the Pantheon Bronze," in *Sankt Peter in Rom 1506–2006,* ed. Georg Satzinger and Sebastian Schütze, Munich 2008, pp. 337–352.

55 Rice 2008a ("Urbano VIII"), pp. 95–96. As Rice discusses, the unusual cross-section of the trusses over the central aisle made space for the semicircular barrel-vaulted ceiling that was in all likelihood suspended from the trusses. This need arose, she argues, due to the revisions to the portico as a whole. The substitution of smaller columns dictated vaults that were 5/4 ft wider and 5/8 ft taller. Meanwhile, the usable height was significantly reduced, since in the revised design, the entablature – and hence the roof space – would have been about 3 ft shorter than the original. In effect, then, more than a meter was subtracted from the height that would otherwise have been available for the vaulting.

56 Rice 2008a, pp. 95–96. This is curious given the semicircular profile of the projecting ledge, over a foot deep, formed by the relieving arches placed at the right height to accept a barrel vault, save that the trusses impeded such a solution (Fig. 7.13, G), hence, the probable implementation of a flat ceiling. I was able to observe this detail thanks to scaffolding and a tour of operations conducted by Giovanni Belardi. The extra meter or so available in the original design could have accommodated a fully semicircular form, though this would have been at a higher level; see Fig. 7.13.

57 The stone blocks projecting from the upper part of the transitional block may have facilitated constructional operations, but there is also the possibility that they were intended to provide some kind of connection with the trusses of the abandoned project (Fig. 7.13, B and C).

58 I have no particular opinion on the three rough blocks immediately above the architrave that runs on top of the capitals, though they may have participated in anchoring the bronze assembly associated with the ceiling of the side aisles.

59 As regards the original project, it is also impossible to know how the transitional block should have looked. It could have terminated more or less as it does today, or it could have been capped by a continuation of the (higher) portico roof; see Davies, Hemsoll, and Wilson Jones 1987, Figs. 7 and 8.

60 On brickstamps and their interpretation, see Heinrich Dressel, *Inscriptiones urbis Romae latinae*, Berlin 1891; Bloch 1947; E. M. Steinby, "La cronologia delle figliane doliare urbane dalla fine dell'età repubblicana fino all'inizio del III sec.," *Bullettino di archeologia cristiana* 84, 1977, pp. 7–113; T. Helen, *Organisation of Roman Brick Production in the First and Second Century AD*, Helsinki 1975; Janet DeLaine, "Building Activity in Ostia in the Second Century AD," *Acta Instituti Romani Finlandiae* 26, 2002, pp. 41–102, and Chapter Three in the present volume. I am grateful to

John Bodel for expert guidance on the finer points involved.

61 A typical lag of a few months twixt production and use would be understandable, in part because stamps were imprinted in wet clay, which had to dry before firing, in part for any flaws that might develop to make themselves evident. At times, bricks may have been rushed to market, or they may have been set aside for later use. Note divergent views on this and the implications for Trajan's Markets, where Domitianic brickstamps may indicate a Domitianic inception (E.Bianchi, "I bolli laterizi dei Mercati Traiani," *Bullettino di archeologia cristiana* 104, 2003, pp. 329–352), or as stockpiled supplies consistent with a Trajanic date (J. C. Anderson, Jr., "The Date of the Thermae Traiani and the Topography of the Oppius Mons," *American Journal of Archaeology* 89, 1985, pp. 499–509; Lynne Lancaster, "The Date of Trajan's Markets: An Assessment in Light of Some Unpublished Brick Stamps," *Papers of the British School at Rome* 63, 1995, pp. 25–44).

62 Guey 1936; Bloch 1947, pp. 14–19, 102–117, esp. 112. Cf. MacDonald 1982, p. 96; Licht 1968, pp. 180–190, esp. 186–187. A few Severan stamps result from repairs of that period.

63 Guey 1936, esp. p. 233; Bloch 1947, esp. p. 112, who quoted Guey's expression for their distribution: "un peu partout dans la bâtisse."

64 Wolf-Dieter Heilmeyer, "Apollodorus von Damaskus – der Architekt des Pantheon," *Jahrbuch des Deutschen Archäologischen Instituts* 90, 1975, pp. 316–347. Cf. Haselberger 1994, pp. 296–298.

65 Bloch 1947, p. 114.

66 "... da me letto il giorno 25 aprile su d'una scaglia di mattone, cavata dal tasto fatto presso lo spigolo N-E. della fronte laterizia, dietro il pilastro marmoreo del portico" (Rodolfo Lanciani, *Pagan and Christian Rome*, Boston 1892, p. 153, cited by Bloch 1947, p. 107). The incomplete text of this stamp may match a frequently attested brickstamp (CIL 549a-d) of the year 123, but in any case the letters *PAETI* point to the consul Paetinus and, hence, the same date.

67 Bloch (1947, p. 114) judged the stamp to have belonged not to a bipedalis embedded into the structure but one of the *semilateres* of the lining.

68 Bloch 1947, p. 117. Cf. Licht 1968, p. 186; William L. MacDonald and John Pinto, *Hadrian's Villa and Its Legacy*, New Haven 1995, pp. 17–19; Anthony R. Birley, *Hadrian: The Restless Emperor*, London 1997; Wilson Jones 2000, pp. 177, 210–211.

69 Peña 1989.

70 A date of 119/120 also seems too early for the Temple of Trajan, presuming its design not to have begun before his death in the summer of 117.

71 For recent affirmation of Hadrian acting in effect as an architect, see E. Salza PrinaRicotti, *Villa Adriano: il sogno di un imperatore*, Rome 2001, pp. 19–25. For collected opinion and a more critical appraisal, see Chapter Three in this volume.

72 Scriptores Historiae Augustae, S.H.A.*Hadrian* 19.2–13; Procopius of Caesarea, *On Buildings*, 4.6.12–13. See also MacDonald 1982, p. 130. On the career of Apollodorus, see C. Leon, *Apollodorus von Damaskus und die trajanische Architektur*, Innsbruck 1961; MacDonald 1982, pp. 129–134; La Regina 1999; Wilson Jones 2000, pp. 21–24; F. Festa Farina, G. Calcani, C. Meucci, and M. Conforto, eds., *Tra Damasco e Roma: l'architettura di Apollodoro nella cultura classica*, Rome 2001.

73 See Wolf-Dieter Heilmeyer, "Korinthische Normalkapitelle: Studien zur Geschichte der römischen Architekturdekoration," *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung*, Supplement 16, 1970, pp. 158–161, on the capitals. Following a hint by Bloch (1947, p. 116), the attribution of the Pantheon was argued in depth by Heilmeyer (1975). For amplification, see Wilson Jones 2000, pp. 192–193; Viscogliosi 2001, pp. 158–159; Heene 2004; Wilson Jones, "Who Built the Pantheon? Agrippa, Apollodorus, Hadrian and Trajan," *Hadrian: Art, Politics and Economy*, ed. Thorsten Opper, *British Museum Research Publications* 175, London 2013, pp. 31–49.

74 Wilson Jones 2000, p. 192. Cf. Kjeld de Fine Licht, *Untersuchungen an den Trajansthermen zu Rom*, Copenhagen 1974.

75 Piers from the bridge are to be found at Turnu-Severin in Romania. See A.Barcacila, "Les piliers du pont Trajan sur la rive gauche du Danube et la scène CI de Colonne Trajan," *Studi su Cercetari de Istorie Veche* 17, 1966, pp. 645–663; Colin O'Connor, *Roman Bridges*, Cambridge 1993, pp. 142–145; J. Coulston, "Transport and Travel on Trajan's Column," in *Travel and Geography in the Roman Empire*, ed. C. Adams and R. Laurence, London 2001, pp. 106–137, esp. 124–125.

76 By referring his readers to Apollodorus's treatise, Procopius kept brief his own mention (*De Aedificiis*, 4.6.11–16). For a fuller account see Dio Cassius, 68.13.1–6.

77 Dio Cassius, 69.4. For the passage in full, see MacDonald 1965, pp. 131–132; Wilson Jones

2000, pp. 23–24.

78 F. E. Brown, “Hadrianic Architecture,” *Essays in Memory of Karl Lehmann*, ed. L. F. Sandler, New York 1964, pp. 55–58; MacDonald 1982, p. 135.

79 Wilson Jones 2000, pp. 192–193, 212–213; Wilson Jones 2013.

Eight The Pantheon in the Middle Ages

Erik Thunø

What happened to the Pantheon as a building during the passage of time between its Hadrianic dedication and its appropriation by the Church almost half a millennium later? The relevant facts are scarce, but there can be little doubt that the building was maintained as well as admired in the first centuries after its construction. Supporting this assumption is an inscription on the front architrave of the portico recording that the Rotunda was restored in AD 202.[1] In the first half of the third century, the Christian historian Iulius Africanus (c. 160–c. 240) reports the establishment of a library in or near the Pantheon, which may suggest a change in the use of the building.[2] In 357, the Pantheon was still in good enough condition to impress the emperor Constantius II during his visit to Rome from Constantinople. At the end of the fourth century, the Roman historian Ammianus Marcellinus (c. 330–c. 400) wrote that the emperor had been amazed at Rome's buildings, including the Pantheon, which was "like a rounded city-district, vaulted over in lofty beauty."[3] By this time, Rome was changing into a Christian city in the wake of emperor Constantine the Great's legitimization of Christianity in 313. At Constantine's behest and with his sponsorship, the city received a cathedral, the Lateran Church, and the great basilica of St. Peter was rising over the body of the apostle outside the walls of the Eternal City, to be followed by an almost equally impressive basilica dedicated to St. Paul. Meanwhile, in 330, Constantine shifted the empire's capital to Constantinople.[4]

It is uncertain how these significant urban, political, and religious events affected the Pantheon and the role it played in daily life in Rome. Its survival and reputation were such that, little more than a decade after Constantius's visit to Rome, either in 368 or 370, the Rotunda was explicitly mentioned as the place in which an imperial law was announced to the public.[5] Thereafter, we hear nothing about the Pantheon until the early seventh century, when Pope Boniface IV requested the emperor's permission to transform the building into a church.

During the centuries preceding the conversion of the Pantheon, the material glory of ancient Rome was disintegrating. A significant number of urban spaces and buildings had fallen into a state of serious decay, and were gradually spoliated to furnish materials for the new Christian basilicas that were being built inside and outside the walls of the city. The situation was worsened during the fifth and sixth centuries when the city was besieged and sacked by foreign invaders on several occasions. The population shrank, and a number of heavy earthquakes and inundations from the Tiber certainly did their part to contribute to the city's deterioration.[6] We have no record referring specifically to the Pantheon and its status during these difficult times, but as one of the ancient city's largest and most central monuments, it is hard to imagine that it remained unaffected. It was probably during this period, for instance, that the pagan statues reported to have adorned the interior of the ancient temple disappeared.[7] How the building itself managed to survive can only be suggested by the account of the Byzantine historian Procopius (died 565): "[T]he Romans love their city above all the men we know, and they are eager to protect all their ancestral treasures and to preserve them, so that nothing of the ancient glory of Rome may be obliterated. For even though they were for a long time under Barbarian sway, they preserved the buildings of the city and most of its adornments, such as they could through

the excellence of their workmanship notwithstanding so long a lapse of time and such neglect."[8]

Whereas the Pantheon thus remained standing, much of what surrounded it in the formerly busy Campus Martius with its many public buildings must have quickly fallen into decay, since already in 398 there was a prohibition issued against the construction of hovels within or adjacent to the antiquities in the Campus Martius. Over the centuries, the gradual abandon and dilapidation of the ancient city also caused the ground level around the Pantheon to rise, giving the persistent impression that the Rotunda had sunk into the ground.[9]

The Christian Consecration

The long history of the Pantheon in the Middle Ages is inextricably bound up with the decision made during the pontificate of Boniface IV (608–615) to transform the ancient building into a Christian church.[10] Because Rome was under Byzantine control during this period, the pope had asked the emperor Phocas (602–610) in Constantinople for permission to appropriate the building for the Church. The contemporary account of the life and donations of Pope Boniface (in the *Liber Pontificalis*) mentions briefly that "he [Boniface] asked the emperor Phocas for the temple called the Pantheon, and in it he made the church of the ever-virgin St Mary and all martyrs (*S. Mariae ad martyres*); in this church the emperor presented many gifts."[11] Although the original purpose of the Pantheon is still subject to discussion, in the Early Middle Ages, obviously, the Pantheon was known as a "temple" (*templum*).[12] If indeed the Pantheon originally served as a temple, architectonically it was not a temple in the conventional sense, a fact that may have facilitated its conversion into a church.[13]

Medieval liturgical calendars make it clear that the Christian consecration of the Pantheon took place on a May 13, although the exact year of the consecration has remained uncertain. It has therefore been suggested that if the consecration of the Pantheon took place on a Sunday during Boniface's papacy, it would have had to occur on May 13 of 613. Yet it does not seem to have been required by the Roman Church that consecrations took place on Sundays.[14] It is therefore possible that the Pantheon was consecrated no later than 610, at which time Emperor Phocas was still alive and able to present the newly consecrated church with gifts, as recorded by the *Liber Pontificalis*. Since Boniface was elected pope in August 608 and the consecration of the Pantheon took place in the month of May, only the years 609 and 610 are plausible dates. There is no further evidence, however, in favor of one of these years over that of 613. Nevertheless, in order to narrow it down, the consecration of the Pantheon has sometimes been associated with the placement of the Column of Phocas on the Forum Romanum. In the month of August 608, this column was set up by the Byzantine exarch of Italy to honor the Byzantine emperor and his newly achieved one-year truce with the Longobards, who had threatened Rome with invasion. According to this hypothesis, the emperor's concession of the Pantheon to the Church might have taken place in this new, albeit short-lived, moment of reconciliation and peace. If so, it is likely that Phocas reacted promptly, that is, in 609 rather than in 610, and that the Pantheon was consecrated within that same year.[15]

The collective dedication of the Pantheon to "all the martyrs" meant that the annual celebration of *S. Mariae ad martyres* on May 13 also became the origin of the Roman feast in honor of all saints.[16] As the English historian the Venerable Bede (673?–735) declared about a century later, the collective

dedication was aimed at replacing the earlier dedication of the building to the *pantheon* of the pagan gods and thus at substituting saints for demons, a claim that was repeated throughout the Middle Ages.[17] The oft-repeated story that Pope Boniface had 28 cartloads of martyrs' bones transferred here from the catacombs outside the walls of Rome was probably invented during the Counter Reformation a millennium later than the Christian consecration, and bears little resemblance to the seventh-century cult of relics in Rome.[18]

In the beginning, the Pantheon was simply recorded in liturgical sources as *ad martyres*, but already by the mid seventh century, the Sanctae Mariae ad martyres, as it officially appeared in administrative sources after 650, was becoming dominant. From the second half of the eighth century, the Pantheon was also called by its unofficial nickname, *Sanctae Mariae Rotundae*.[19] Whereas the dedication of the building to all the martyrs may be equated with that of all the pagan gods in the ancient Pantheon, the additional dedication to the Virgin is puzzling. The Virgin Mary was, of course, not a martyr, and was already honored in the dedications of many older churches in Rome, such as S. Maria Maggiore, S. Maria in Trastevere, and S. Maria Antiqua.[20]

The best-known medieval guidebook to the city of Rome, the *Mirabilia Urbis Romae*, compiled circa 1140 by Benedict, a canon of St. Peter's, claims that the dedication to the Virgin replaced the original one to Cybele, considered the mother of all the ancient gods.[21] Be that as it may, the Christian dedication to the Virgin may well be associated not with Cybele but with the circular shape of the Pantheon. Until the conversion of the Rotunda, there was no Marian church in Rome with a centralized plan. Although frequently associated with Marian dedications in the early modern period, centralized memorials (*memoriae*) dedicated to the Virgin Mary were common in the eastern part of the Christian world from the fifth century on. Perhaps the most famous was the Chapel of the Hagios Soros in Constantinople. From the early seventh century, this well-documented chapel seems to have been among the main sanctuaries of the Byzantine capital, probably housing important Marian relics, such as the belt and shroud that she had left behind when she ascended to heaven. This no-longer extant chapel was circular and seems to have been domed. It was preceded by an entrance hall (*narthex*) and terminated on the opposite side with an apse. Since at the time of the consecration of the Pantheon Rome was under strong Byzantine influence, it seems possible that the idea of dedicating a circular sanctuary to the Virgin was imported from the East, and that Hagios Soros in Constantinople may have served as an immediate source of inspiration.[22]

Unlike the Byzantine prototype, the Pantheon could boast no relics to evoke the presence of the Virgin Mary within its sanctuary. On the other hand, the Rotunda possessed another kind of sacred object that evoked the Virgin's presence just as strongly as did a relic, that is, an icon (Fig. 8.1). The image, partially broken but still preserved inside the Pantheon, presents the Virgin dressed in a maphorion, holding the Child in her left arm while pointing to him with her right.[23] The icon is first mentioned in an episode that occurred during Stephen III's pontificate (768–772). The Lombard priest Waldipert, who had failed in a plot against the Romans, took refuge in the Pantheon where he held tenaciously to the "image of God's mother" to save himself from murder at the hands of the Romans who pursued him.[24] The icon does not appear in earlier written sources, but is sometimes believed to have been produced as early as the period of the Christian consecration of the Pantheon, although this cannot be proven on technical grounds. Such an early dating would make the icon one of the oldest in Rome and the only "temple" image directly related to the consecration of the sanctuary where it would take up residence. Other venerable Marian icons in Rome that probably date to the late sixth

and seventh centuries include the so-called Salus Populi Romani from S. Maria Maggiore, and the Madonna of S. Maria Nuova, originally from S. Maria Antiqua, a remodeled ancient building in the Roman Forum. Both churches were among the oldest Marian sanctuaries in Rome, dating respectively to the early fifth and sixth centuries and thus predating the installation of their icons.[25]

8.1. Madonna and Child icon from the Pantheon, seventh century? (Bibliotheca Hertziana – Max-Planck-Institut für Kunstgeschichte, Rome)

The Christianized Pantheon may thus have fused the eastern practice of dedicating centralized sanctuaries to the Virgin Mary with the idea – which seems to have become Roman practice in the late sixth or seventh centuries – of providing a Marian church with an icon of the Virgin and Child. At the Pantheon, the icon would thus have served as the equivalent for the important contact relics of the

Virgin in the Constantinopolitan Soros church. It is possible, however, that the Marian icon was not installed until sometime after 650 when the church changed its official name from the generic designation ad martyres, to Sanctae Mariae ad martyres. The explicit emphasis on the Virgin Mary in the new dedication may thus be attributable to the arrival of the icon. From the second half of the eighth century, the circular shape of the church was embodied in the popular name, Sanctae Mariae Rotundae, which became its official name by the beginning of the twelfth century.[26]

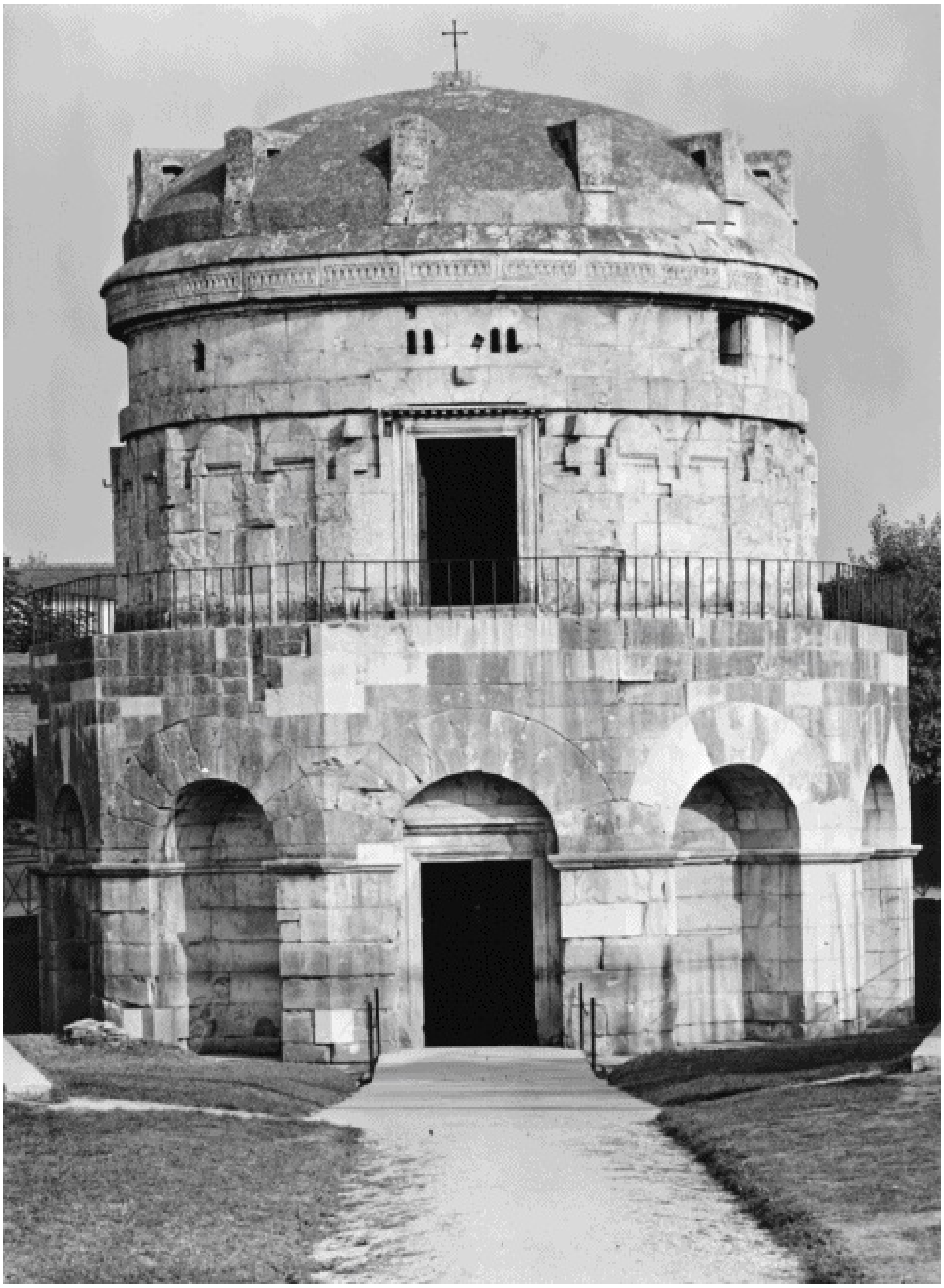
The Pantheon as Source

The architectural uniqueness of the Pantheon meant that the building became a popular source of inspiration for medieval builders. Although it was impossible to emulate its revolutionary construction techniques, which had been lost, the basic design of the Rotunda – a circular plan with enveloping niches topped by a dome – permeates several Late Antique imperial mausolea and early medieval churches across and beyond Europe. Close "academic" copies of the Pantheon can be seen in the mausolea at Maxentius's Circus (307–312) on the Via Appia and in that of the Tor de'Schiavi (c. 300) on the Via Prenestina in Rome (Fig. 8.2). Other examples inspired by the Rotunda include the fourth-century imperial mausolea of Helena and Constantina. Moreover, matching the Roman prototype in form is Constantine the Great's domed rotunda of the Holy Sepulchre in Jerusalem marking the site of Christ's tomb and Resurrection.[27]

8.2. Exterior of Mausoleum of Tor de'Schiavi, Rome, c. 300. (Bibliotheca Hertziana – Max-

Planck-Institut für Kunstgeschichte, Rome)

Toward the end of the seventh century, the English churchman and pilgrim to Rome Wilfrid built a circular church at Hexham, now known only through written sources. Since the church with its unusual circular plan was also dedicated to the Virgin, there can be little doubt that it was ultimately modeled on the Pantheon, the only important circular Marian church in Rome. The English example points to the Pantheon – Santa Maria Rotonda – as the prototype for many later medieval centrally planned churches in the West dedicated to the Virgin.[28] An interesting centralized building, which both as a Late Antique mausoleum and Marian church becomes linked to the Pantheon, is Theodoric the Great's early sixth-century mausoleum in Ravenna, Italy (Fig. 8.3). In the mid ninth century, the tomb of the Ostrogothic king was transformed into a church and explicitly named "Sancta Maria Rotunda." By the middle of the eleventh century, it was referred to as "the basilica of St. Mary which is shaped in the likeness of the Roman Pantheon."[29] In reality, the centralized mausoleum is a polygonal, two-storied building with walls encircled by niches and topped by a huge monolithic stone shaped as a dome. The fact that the mausoleum was polygonal, crowned by a dome, and incorporating niches all around was enough to recall the Pantheon. The same features characterize several chapels of the Carolingian period, all of them dedicated to the Virgin Mary in the "likeness" of the great Roman prototype.[30]



8.3. Exterior of Theodoric's Mausoleum in Ravenna, early sixth century. (Deutsches Archäologisches Institut, Rome)

The Pantheon thus served as the generic source for a vast number of centralized Marian sanctuaries throughout medieval Europe. This reception is indicative of the exceptional monument that it was. To be sure, its uniqueness derived not only from its circular plan and dome but primarily from its being the Pantheon, an ingenious and stunning example of ancient architecture that overshadowed all later buildings. The Golden Legend (*Legenda aurea*) provides a glimpse of the medieval perception of this monument; according to this thirteenth-century compilation of readings on the saints, the Pantheon was a "temple higher and more marvelous than the rest."[31]

Inside Santa Maria Rotonda

The Pantheon suffered surprisingly few alterations in its conversion to new use. The cylindrical space absorbed its new religious functions without any serious alterations of the layout by Hadrian's

architects; it was not compromised by any inner divisions nor was its function or original north–south axis reoriented.

Such a smooth transition, accompanied by only minor structural changes, comes as less of a surprise in cases like the Forum churches of Ss. Cosmas and Damian, a former secular hall the original function of which remains unknown; S. Maria Antiqua, a former ceremonial hall providing entrance to the Palatine Hill; and S. Adriano, the former senate house (Fig. 8.4). The principal structure of each of these churches comprised a rectangular, fully covered hall.[32] The latter was able to accommodate and serve the same functions as the basilica, the preferred building type adapted by Christians for their places of worship, as exemplified by Old St. Peter's. We may therefore wonder if the unique space of the Pantheon was as easy to adapt as was that of the three churches on the Forum. Was there any question, for instance, about where to locate the altar inside the circular space? And were there any precedent cases of circular churches in Rome that could have served as models?

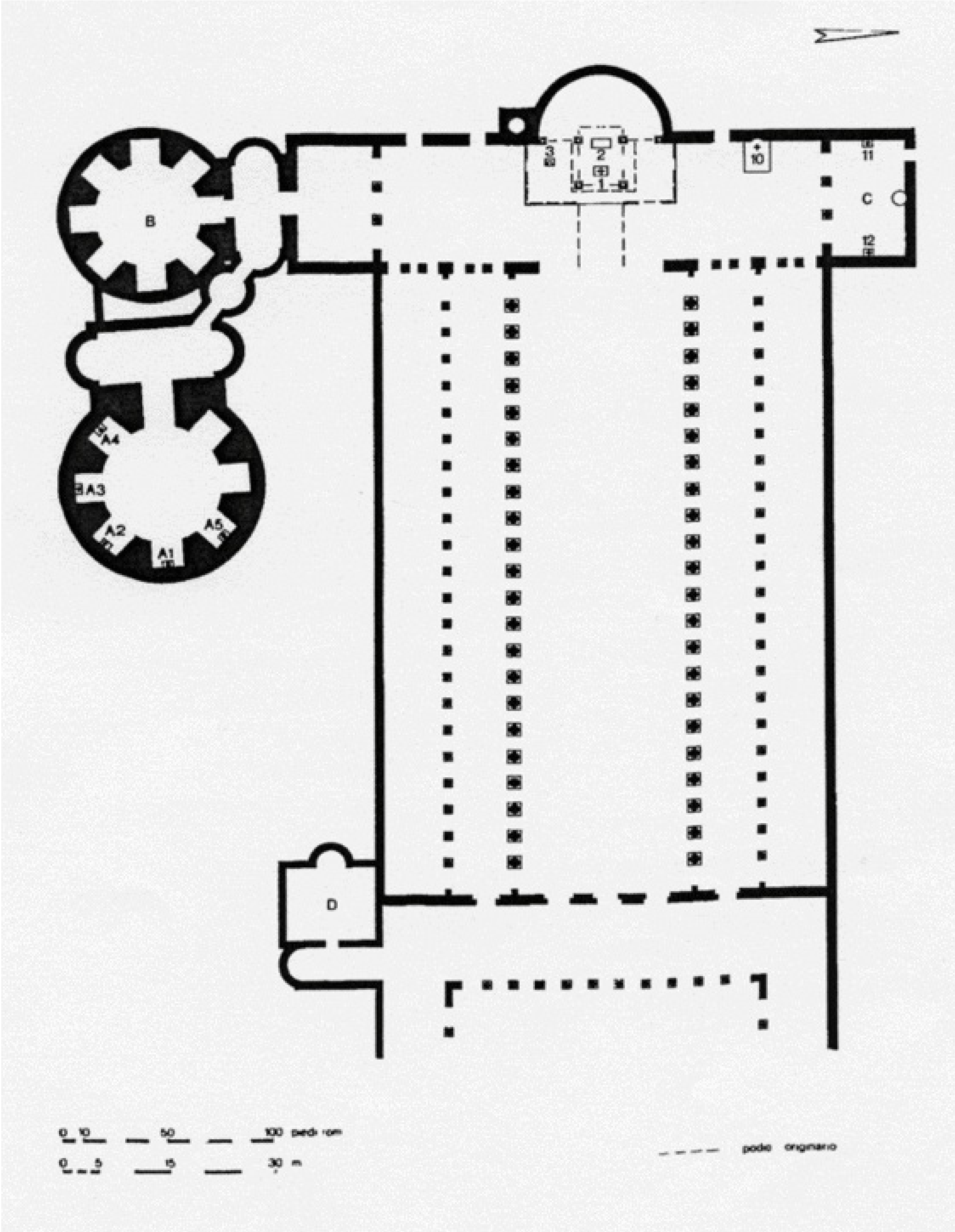
8.4. Exterior of S. Adriano, the former Roman Curia, Rome. (Deutsches Archäologisches Institut, Rome)

Despite the enormous success of the ancient basilica form for accommodating Christian worship, it was indeed not the only type of church plan in use. Two circular churches had in fact been built

before the conversion of the Pantheon. The first was S. Stefano al Monte Celio, also known as S Stefano Rotondo, dedicated by Pope Simplicius (468–483), with a circumference almost as large as the Pantheon's (Fig. 8.5). Although S. Stefano Rotondo probably served as the local model that legitimized the circular plan for Christian use, no exact records have survived testifying to the original location of the altar.[33]

8.5. Interior of S. Stefano Rotondo, Rome. (Bibliotheca Hertziana – Max-Planck-Institut für Kunstgeschichte, Rome)

Whereas S. Stefano was built ex novo as a church, the other much smaller circular church predating the conversion of the Pantheon was originally an ancient mausoleum associated with the cemetery where the Apostle Peter was buried. Pope Symmachus (498–514) transformed the building, which had served as an annex to Old St. Peter's, into a separate church dedicated to St. Andrea Reminiscent of the Pantheon, the circular space of S. Andrea was surmounted by a dome, and the surrounding wall was pierced by seven niches (Fig. 8.6). As documented by Sible De Blaauw, the main altar, dedicated to St. Andrew, was placed in the eastern niche directly opposite the entrance and provided with an altar canopy (*ciborium*). Altars were originally installed in four of the other niches, whereas the remaining two were "filled" only in the eighth century.

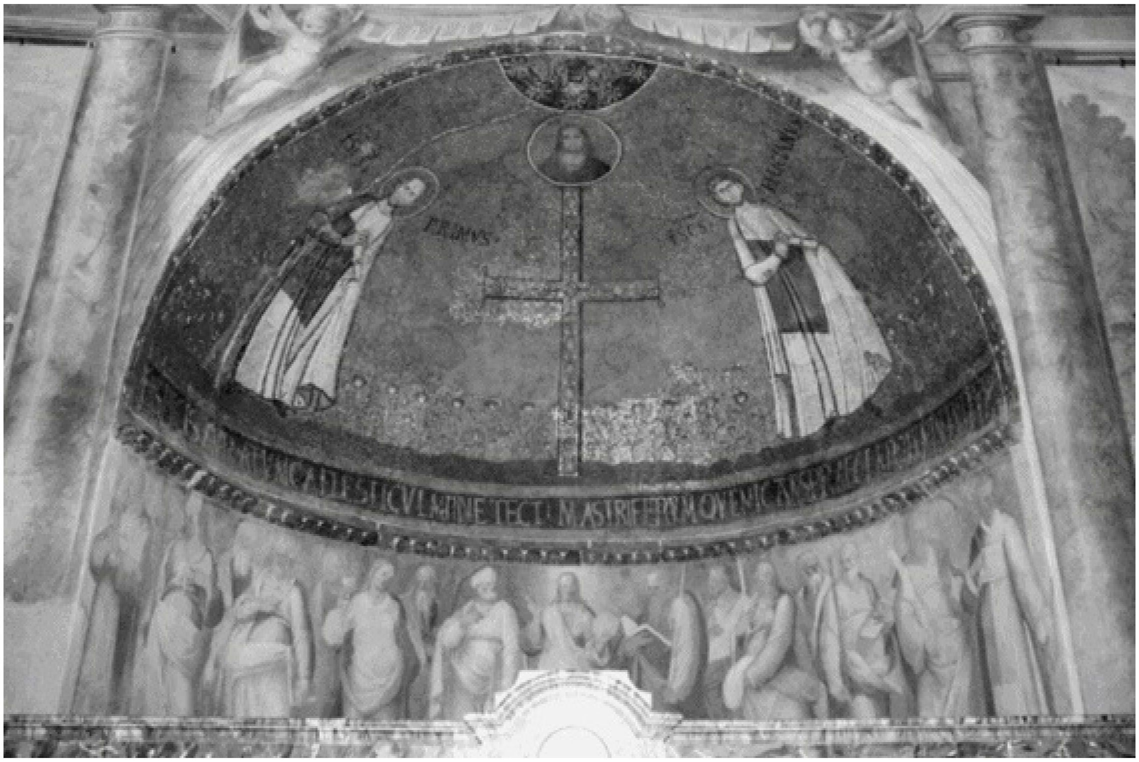


8.6. S. Andrea, with chapels labeled, attached to Old St. Peter's. (Sible De Blaauw, *Cultus et Decor. Liturgia e architettura nella Roma tardoantica e medievale*, Vatican City 1994, Fig. 19)

Like S. Andrea (Fig. 8.6, A1), the church of Santa Maria Rotonda also had the main altar situated directly opposite the entrance in the main exedra where Hadrian's throne had presumably once stood. Indeed, in contrast to the alternating rectangular and semicircular exedras, the main exedra in Hadrian's rotunda had already been emphasized by two Corinthian columns projecting into the central space. In this way, the original main axis of the building – from the barrel-vaulted entrance corridor to the principal exedra inside the rotunda – proved amenable to the new Christian context. As for the lateral niches, shortly before the middle of the ninth century the Carolingian poet and biblical exegete Walafried Strabo (c. 808–849) recorded that the Pantheon was a church with altars oriented in "all directions of the wind."[34] This certainly suggests the placement of side altars in the lateral exedras. If

so, S. Andrea may have served as the direct model for this arrangement, which may be datable to the time of the Christian consecration of the Pantheon.[35]

On account of its importance as the backdrop for the main altar and the celebration of the Mass, the half dome of the main apse was decorated in a fittingly Christian manner, with a mosaic showing a cross in the center similar to the apse mosaic commissioned by Pope Theodore (642–649) for the church of S. Stefano Rotondo (Fig. 8.7). Since the remains of this mosaic were recorded only in the late sixteenth century, we cannot be certain that it dates back to the time of the Christian consecration, though it seems probable.[36]



8.7. Apse mosaic of S. Stefano Rotondo. (Alinari 1941)

We also know that the main altar of the Pantheon was placed under a ciborium of silver and covered by a precious purple cloth (*coopertorium*) donated by Pope Benedict II (684–685). About a century later, Pope Hadrian I (772–795) restored the ciborium, which, as his contemporary biography states, "had been worn away by age," and fifty years later the same canopy was completely replaced.[37] The practice of adorning an altar with a precious canopy and replacing it periodically appears to have been common, and in the case of S. Andrea, the genealogy of the canopy can be traced back to the consecration of the church in the early sixth century.[38] Hence, the main altar in Santa Maria Rotonda may also have received its first ciborium at the time of its consecration around 609.

Also dating back to the year 609 may have been a large rectangular podium nearly 1 meter high, on which the altar was placed (see Fig. 9.6 and Plate V). Descriptions and drawings from the seventeenth century allow us to reconstruct the original situation with some precision.[39] The podium, which was renovated by Pope Innocent VIII (1484–1492), filled the apse and extended some 7 meters into the central space. Surrounding it on all three of its freestanding sides was a *pergola*: a parapet of marble and porphyry plates separated by six porphyry columns carrying an architrave. The podium could be accessed from the front through the central intercolumniation. The altar, surmounted by its

canopy supported by four porphyry columns, was placed on the chord of the apse. The back and sides were covered with porphyry plates, while the front was pierced by a so-called fenestrella, a window through which one could peer into the interior of the altar. Such an arrangement suggests the presence of relics inside the altar. Sources going back to the fifteenth century record the relics under the altar as those of the martyrs Rasius and Anastasius, and one of the reliquaries containing these relics records that Boniface himself deposited them there following a Roman tradition established by Pope Gregory the Great (590–604). These martyrs, however, appear neither in the medieval sources nor in the liturgical calendar of Santa Maria Rotonda. If the remains of these martyrs were buried under the main altar by Boniface himself, they evidently did not play an important role in the Christian worship related to the church.[40]

Several parts of the altar podium survive and are datable to the later Middle Ages, but the use of porphyry suggests an early medieval origin, as does the idea of an elevated podium in and in front of the apse and equipped with a pergola.[41] Probably between 588 and 604, and thus just a few years prior to the conversion of the Pantheon, a similar altar arrangement had been designed for Old St. Peter's to meet the requirements of the stational liturgy (see the last section of this essay).[42] What would have been more natural than for Boniface VIII to have imitated the most recent and authoritative model of the altar of Old St. Peter's for his new church in the Campus Martius?

Besides the altar arrangement resembling that recently developed for Old St. Peter's, Santa Maria Rotonda also needed a choir to accommodate singers and lower-ranked clerics. Yet it is hard to imagine a choir situated in front of the altar podium since it would thus have nearly coincided with the area beneath the wide opening at the center of the dome, and thus have been unprotected against the rain, which is seasonally heavy in Rome.[43] Any permanent solution for a choir inside Santa Maria Rotonda is therefore difficult to imagine. Another problem would have been designating a space to serve as a sacristy where the clergy could maintain their vestments and keep their liturgical utensils.

Santa Maria Rotonda from Outside

Before entering Santa Maria Rotonda, the medieval visitor would have observed a number of ancient statues in the piazza in front of its entrance hall. The *Narracio de Mirabilibus Urbis Romae*, written sometime during the thirteenth century by an otherwise unknown Magister Gregorius and related to the aforementioned *Mirabilia Urbis Romae* in that it also describes the topography and ancient monuments of Rome, is the earliest source to describe the following scenario: "It has a spacious portico, supported by many lofty columns, and in front of it remain to this day a basin and other wonderful porphyry vessels, as well as lions and other statues made of the same material."[44] Some of these statues seem to have been in place in front of the Pantheon from antiquity; others were probably added subsequently as *spolia* from ancient monuments.

Whereas the interior of the Pantheon was left basically untouched except for additions related to the accommodation of the altar, the exterior of the building underwent several important modifications over the course of time. Some of these were functional to the building itself, while others were less well intentioned, as in the case of the Byzantine emperor Constans II (641–668) who came to Rome on a pilgrimage in 663 and had the gilded bronze plates removed from the dome and shipped to Constantinople. This loss was to some extent compensated for in the eighth century when

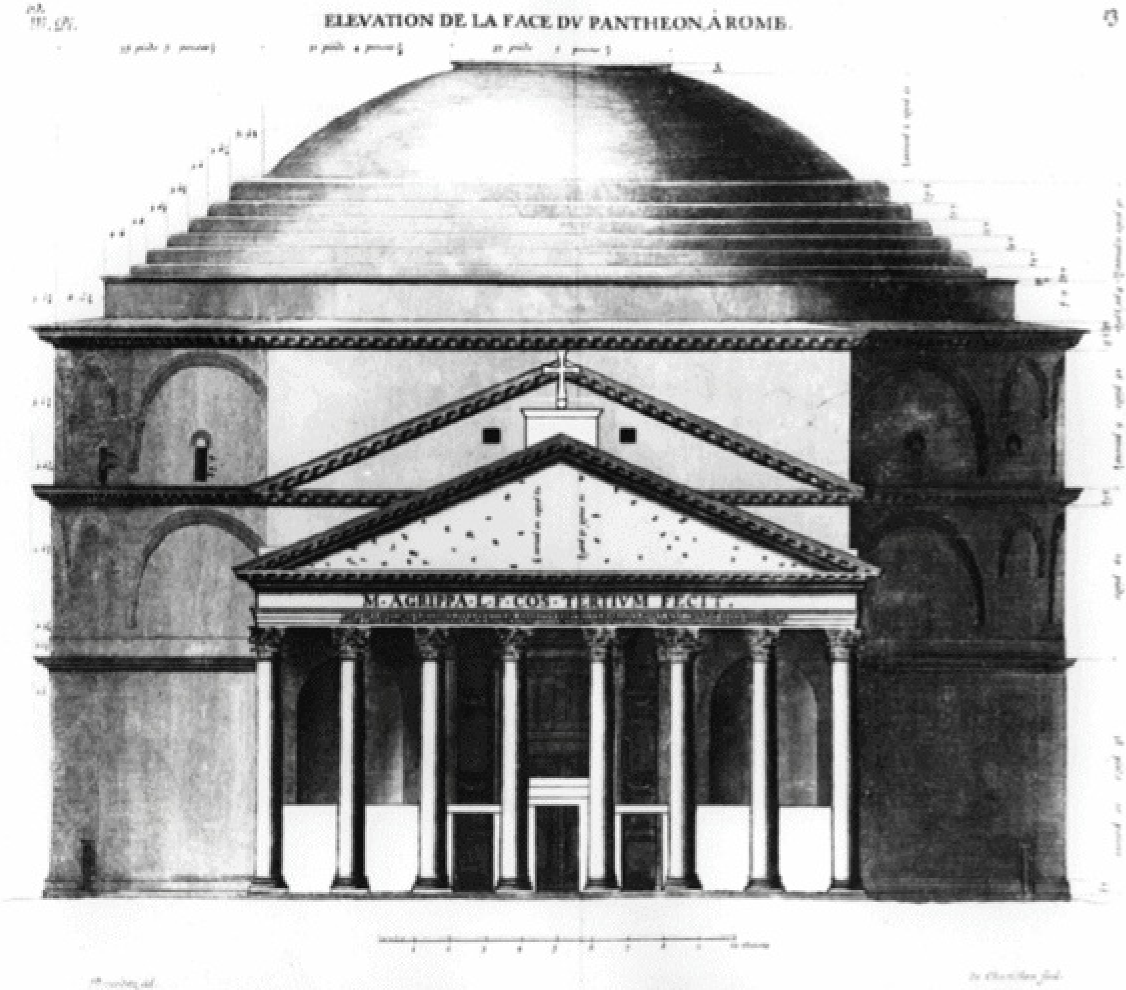
the roof of the cupola was lined with lead sheets.[45] The spoliation of materials from the Pantheon is a reminder that its conversion to Christian purpose did not prevent its selective depredation.

Among the early embellishments added to the Christian building was a Latin cross set above the triangular gable surmounting the columned portico. According to a decree issued by Theodosius II in 435, this type of cross was to be erected in cases where a pagan cult building was being reused, as a means of exorcism. The cross of the Pantheon appears in a mural painting by Cimabue in the crossing vault of the choir in the Upper Church of San Francesco inAssisi (Fig. 8.8). The fresco, which dates to the late 1270s, shows the upper part of Santa Maria Rotonda as it appeared prior to this date, since it omits the bell tower (*campanile*) set up in 1270 on top of the gable that was demolished during Urban VIII's pontificate (1623–1644). The year of the erection of the bell tower is recorded in an inscription on a stone tablet, still visible within the Pantheon portico. It is reasonable to assume that the cross was mounted on top of the gabled roof immediately following the conversion, and was done not only to follow the aforementioned decree of 435 but also to advertise the new Christian use of the building. It was removed in the sixteenth century.[46]

8.8. Detail of the Pantheon in a fresco by Cimabue, Upper Church of Assisi. (Kunsthistorisches Institut, Florence)

In fantastical medieval descriptions of the edifice, Santa Maria Rotonda was, moreover, surmounted by the famous *Pigna;* a medieval legend recounted in the *Mirabilia Urbis Romae* tells us that the *Pigna*, a huge ancient bronze pine cone that once stood in the atrium of Old St. Peter's and can now be admired in the Belvedere Court of the Vatican Museum, was placed on top of Santa Maria Rotonda.[47] Probably in conjunction with the placement of the cross on the portico gable, alterations were also made to the portico. All that survives today of these medieval modifications, which were obliterated in the seventeenth century, are eight holes in the shafts of the columns, and traces of cuttings into the six column bases (Fig. 8.9). From this exiguous evidence, and supported by the visual traces found in several drawings and prints, Michael Viktor Schwartz has offered a convincing hypothesis. According to Schwartz's reconstruction, walls rising to a height of nearly 4.5 meters were built between the columns through which one previously entered the Rotunda. The three central openings at the front, however, were left open and turned into a rather impressive portico framed on either side by door frames and topped by entablatures. All the elements seem to have been of marble. The central opening was further monumentalized by being slightly taller and crowned by not one but two lintels, possibly forming a classicizing entablature consisting of an architrave and a cornice with an elaborately carved frieze at the center (Fig. 8.10). If so, perhaps these elements were originally part of another ancient building in Rome, possibly a temple, and reused as spolia in Santa Maria Rotonda, a practice common in church building in Rome and elsewhere throughout the Middle Ages as mentioned previously.[48]

8.9. Columns and shafts. (Bibliotheca Hertziana – Max-Planck-Institut für Kunstgeschichte, Rome)



8.10. Reconstruction drawing of medieval Pantheon facade based on elevation drawing of Antoine Desgodetz. (Bibliotheca Hertziana – Max-Planck-Institut für Kunstgeschichte, Rome)

Comparisons with several surviving monuments may help us to further envisage the no-longer extant medieval portico of the Pantheon. In Rome itself, the original portico of the Lateran Baptistery built by Pope Sixtus III (432–440) consists of two central porphyry columns creating three intercolumniations (Fig. 8.11). The middle of these forms a central portal created by cutting away parts of the column bases and adding jambs and a crowning carved entablature. Flanking this portal are two adjacent ones that are lower, but again with jambs supporting carved lintels. In contrast to the Pantheon, however, these openings are each fitted with two door-like marble plates. Throughout, the materials utilized in the Baptistery are reused marble spolia from other buildings. Thus, though both the overall design and the construction method strongly recall the Pantheon, the uncertain dating of the Lateran portico to a500-year period between the middle of the fifth and the tenth centuries undermines any attempt to specify when the original Pantheon portico could have been modified or what its models were.[49] Only by looking to Constantinople do we find a viable prototype for the Pantheon portico, that is, the portico of the Studios Church, which dates to the fifth century. Here, analogously to the Pantheon, three intercolumniations create a portico comprising a central doorway and two lateral ones enriched by door frames that cut through the column bases and support a lavish entablature inserted between the columns (Fig. 8.12). It also seems that the central intercolumniation once held door frames that were later removed.[50] As argued by Schwartz, Constantinople thus seems to have furnished the inspiration for the type of portico introduced at the Pantheon, and could have already done so during Pope Boniface's pontificate when the Pantheon assumed its official new

function as a church.[51] Besides the interior of the Rotunda itself, the modified portico is the only space that could have accommodated a sacristy, but this possibility remains hypothetical since no trace of such a sacristy survives. As we shall see, it is in fact questionable whether Santa Maria Rotonda needed a sacristy at all.

8.11. Porch of Lateran Baptistery. (Bibliotheca Hertziana – Max-Planck-Institut für Kunstgeschichte, Rome)

8.12. Porch of Studios Church, Constantinople. (Dumbarton Oaks Research Library and Collection, Washington, DC)

Although the change to the original portico was modest in scale and did not affect the exterior of the Rotunda, it transformed the aspect of the ancient building in one significant way: whereas previously visitors could choose to enter the portico through the intercolumniations on its three sides, they were now limited to one of the three central ones, with the middle of the three being most conspicuous due to its height and decoration. In other words, accompanied by the cross on top of the gable and the much later bell tower, the medieval entrance hall gave extra emphasis to the main axis of the Rotunda as originally established by the barrel-vaulted vestibule in front of the great door. The impressive bronze doors, indeed, have always provided the only truly magnificent access to the splendid interior.[52]

Santa Maria Rotonda in Ritual Life

We may well wonder what prompted Pope Boniface to convert an ancient circular building into a church in the first place. To respond to this question, we must consider the role played by Santa Maria Rotonda in the liturgical calendar of medieval Rome.

Almost as unusual as its design was the status that Santa Maria Rotonda held within the city's ritual life. It was neither a presbytery church nor a *diaconia* (a church where food to the poor was distributed), and thus had neither a clergy nor a congregation of its own. Instead, it was made a stational church, that is, one in which the pope held services on certain feast days during the liturgical

year rather than in his cathedral.[53] The days on which the pope held station service in Santa Maria Rotonda were January 1, Easter Friday, and May 13 (consecration day).[54] For these station services, the pope arrived in the Campus Martius as part of a solemn procession that included the entire clergy of the Lateran, other clerics, and laymen.

The station services, which were introduced in the fifth century and increased in number until the twelfth, are best understood as a means of decentralizing the papal liturgy in the Lateran to encompass the other more populated areas of the city. Stational churches were thus extensions of the pope's cathedral. By the beginning of the seventh century, the most important stational churches of Rome included the five so-called patriarchal basilicas of Rome (S. Giovanni in Laterano, S. Pietro, S. Paolo fuori le mura, S. Maria Maggiore, S. Lorenzo fuori le mura) and, secondary to these, the churches of Santa Maria Rotonda, S. Croce in Gerusalemme, SS. Apostoli, and S. Stefano Rotondo.[55]

Around the year 1100, the stational liturgy in S. Maria Rotunda underwent a change. The station of January 1 was transferred to S. Maria in Trastevere and replaced by the *Dominica de Rosa*, a new station service that fell on the Sunday between Christ's Ascension and Pentecost. The purpose of this Sunday was to announce the coming of the Holy Spirit on Pentecost. In the Pantheon, this event was visualized in a spectacular way: while the priest in his sermon announced the arrival of the Holy Spirit, the latter was symbolized by a multitude of roses that were dropped into the church from the top of the cupola. Whether or not the roses actually came down through the oculus, they certainly contributed significantly to the impression of a continuum between heaven and earth during this extraordinary happening.[56]

The decision to create the Pantheon as a stational church would have had several bases. First, the Campus Martius, after the decay of its public buildings, had slowly developed into one of Rome's most densely populated districts, but had remained poor in terms of important church foundations. The conversion of the Pantheon, spacious and capable of accommodating the huge congregation that could be expected for a pontifical Mass, may thus be seen as a quick and efficacious way of giving the Roman Church a significant presence in one of the city's most densely inhabited areas. As an extension of the pope's cathedral at the Lateran, Santa Maria Rotonda brought the pope closer to the people of Rome. However, as a stational church, it was directly serviced by the papal administration, which meant that services were not held in the church on a regular basis. Thus, prior to the twelfth century, no priests or monks are recorded to have provided daily service in the church.[57] This could also explain why the church may never have had a sacristy. In addition, the cupola's huge open eye would have made regular service rather uncomfortable at times; aside from rain that kept the faithful from standing in the center of the church, the opening in the dome would have rendered the space both damp and chilly during the winter season. Clearly, as long as the open eye was not closed – which it never was – the Pantheon was not really a suitable building for daily services. Quite simply, it did not work as an ordinary church. But precisely because of the shortcomings entailed by its unique architectural form, Santa Maria Rotonda was all the more magnificent as a setting for the pope's occasional appearances in the center of medieval Rome.

1 *Corpus Inscriptionum Latinarum* (CIL), ed. Matthaeus della Corte, vol. 6, Berlin 1970, p. 896

Kjeld de Fine Licht, *The Rotunda in Rome: A Study of Hadrian's Pantheon*, Copenhagen 1968, p. 180.

2 Sextus Iulius Africanus, *Cesti: the Extant Fragments*, ed. Martin Wallraff, trans. William Adler, Berlin 2012, pp. 63–68; Licht 1968, pp. 183, 237–238.

3 Ammianus Marcellinus, *Rerum gestarum libri*, fourth century AD, ed. J. C. Rolfe, Cambridge 1956, pp. 249–250; J. B. Ward-Perkins, *From Classical Antiquity to the Middle Ages: Urban Public Building in Northern and Central Italy, AD. 300–850*, Oxford 1984, p. 39.

4 On the Christianization of Rome, see Richard Krautheimer, *Rome – Profile of a City, 312–1308*, Princeton 1980, pp. 33–58; Torgil Magnuson, *The Urban Transformation of Medieval Rome, 312–1420*, Stockholm 2004, pp. 51–64; Hugo Brandenburg, *Ancient Churches of Rome from the Fourth to the Seventh Century*, Turnhout 2005, pp. 16–36, 91–103.

5 Christian Hülsen, "Delle vicende del Pantheon nell'ultima età imperiale," *Bulletino della Commissione Archeologica Comunale di Roma* 54, 1927, pp. 64–66.

6 Magnuson 2004, pp. 64–67. On the urban transformation of early medieval Rome, see also Roberto Meneghini and Riccardo Santangeli Valenzani, *Roma nell'altomedioevo. Topografia e urbanistica della città dal V al X secolo*, Rome 2004, and on the formidable display in the Crypta Balbi Museum just off Largo Argentina in the center of Rome, see Daniele Manacorda, *Crypta Balbi. Archeologia e storia di un paesaggio urbano*, Milan, 2001.

7 Licht 1968, p. 186.

8 *Procopius of Caesarea, The Story of the Wars*, "The Gothic War," IV 22, 5–6, trans. H. B. Dewing, Cambridge 1924; repr. 2000, p. 5; Ward-Perkins 1984, p. 47.

9 William L. MacDonald, *The Pantheon: Design, Meaning and Progeny*. London 1976, repr. 2002, p. 18.

10 For summaries of the history of the Pantheon in the Middle Ages, see Christian Hülsen, *Le Chiese di Roma nel medioevo*, Florence 1927, p. 363; S. B. Platner, *A Topographical Dictionary of Ancient Rome*, ed. Thomas Ashby, Oxford 1929, p. 385; Vittorio Bartoccetti, *Santa Maria ad Martyres*, Rome 1958; Ernest Nash, *Bildlexikon zur Topographie des antiken Rom*, Tübingen 1962, vol. 2, pp. 170–175; Licht 1968, pp. 237–240.

11 *The Book of Pontiffs (Liber Pontificalis): The Ancient Biographies of the First Ninety Roman Bishops to AD 715*, trans. Raymond Davis, Liverpool 1989, p. 62 (translation of *Liber pontificalis*, ed. Louis Duchesne, 3 vols.; vol. 1, Paris 1886; vol. 2, Paris 1892; vol. 3 ed. Cyrill Vogel, Paris 1957); Caecilia Davis-Weyer, "S. Stefano Rotondo in Rome and the Oratory of Theodore I," *Italian Church Decoration of the Middle Ages and Early Renaissance*, ed. William Tronzo, Bologna, 1989, p. 62. On this source, see most recently Herman Geertman (ed.), *Il Liber Pontificalis e la storia materiale*, Assen 2003. The dedication is also mentioned by Paul the Deacon, *History of the Lombards*, trans. William Dudley, Philadelphia 1974, pp. 177–178, and repeated by John the Deacon, *Chronicon Venetum, I, 21*, ed. and trans. Luigi Andrea Berto, Bologna 1999. On Pope Boniface and the consecration of the Pantheon, see Mirella Colucci, *Bonifacio IV (608–615): momenti e questioni di un pontificato*, Rome 1976, pp. 25–37; see also Ferdinand Gregorovius, *Geschichte der Stadt Rom im Mittelalter*, ed. Waldemar Kampf, 7 vols., Munich 1978; vol. 1, pp. 286–290.

12 Paul Godfrey and David Hemsoll, "The Pantheon: Temple or Rotunda?" *Pagan Gods and Shrines of the Roman Empire*, ed. Martin Henig et. al., Oxford 1986, pp. 195–209.

13 On the transformation of temples to churches in the Christian East and West, see Friedrich Wilhelm Deichmann, "Frühchristliche Kirchen in antiken Heiligtümern," *Jahrbuch des Deutschen Archäologischen Instituts* 54, 1939, pp. 105–136; Brandenburg 2005, pp. 233.

14 For the earliest source mentioning the dedication on a May 13, see Theodor Klauser, *Das römische Capitulare Evangeliorum*, 2nd ed. Münster 1972, p. 73; in favor of 613 are Herman Geertman, *More Veterum. Il* Liber Pontificalis *e gli edifici ecclesiastici di Roma nella tarda antichità e nell'alto medioevo*, Groningen 1975, p. 226, n. 135.1; Sible De Blaauw, "Das Pantheon als christlicher Tempel," *Bild und Formensprache der spätantiken Kunst. Hugo Brandenburg zum 65 Geburtstag*, Münster 1994, pp. 13–26; however, he does call attention to the fact that the dedication did not necessarily have to happen on a Sunday.

15 Francesco Gandolfo, "Luoghi dei santi e luoghi die demoni: Il riuso dei templi nel Medioevo," *Santi e demoni nell'alto medioevo occidentale*, 2 vols., Spoleto 1989; vol. 2, pp. 883–916. Martin Wallraff, "Pantheon und Allerheiligen," *Jahrbuch für Antike und Christentum*, 47, 2004 (appeared 2006), pp. 128–143; for the column of Phocas, see Franz Alto Bauer, *Stadt, Platz und Denkmal in der Spätantike*, Mainz 1996, pp. 43–47. For Pope Boniface and Emperor Phocas, see Colucci 1976, pp. 77–87.

16 Pierre Jounel, *Le culte des saints dans les basiliques du Latran et du Vatican au douzième siècle*, Rome 1977, pp. 103–106; De Blaauw 1994b, p. 14; Wallraff 2004, pp. 139–140, relates the May 13 dedication date to the feast day of all martyrs in Syria.

17 Venerable Bede, "Chronica," in *Chronica Minora*, ed. Theodor Mommsen, 3 vols., Monumenta Germaniae Historica, Berlin 1892–1898; vol. 3, pp. 309–310. Gandolfo 1989, p. 899; Tilmann Buddensieg, "Criticism and Praise of the Pantheon in the Middle Ages and the Renaissance," *Classical Influences on European Culture A.D. 500–1500: Proceedings of an International Conference Held at Kings College, Cambridge, April 1969*, ed. R. R. Bolgar, Cambridge 1971, pp. 259–267; Wallraff 2004, pp. 139–140.

18 Susanna Pasquali, *Il Pantheon: architettura e antiquaria nel Settecento a Roma*, Modena 1996, pp. 24–25; she attributes the story to Cardinal Cesare Baronio in 1586 on p. 215. See also Pietro Lazeri, *Della consecrazione del Pantheon fatta da Bonifazio IV*, Rome 1749, p. 24. On relic translations in early medieval Rome, see J. M. McCulloh, "From Antiquity to the Middle Ages: Continuity and Change in Papal Relic Policy from the 6th to the 8th Century," in E.Dassmann and K. Suso Frank, eds., *Pietas: Festschrift für Bernhard Kötting*, Münster 1980, pp. 313–324; Alan Thacker, "Rome of the Martyrs: Saints Cults and Relics, 4th–7th Century," in *Roma Felix: Formation and Reflections of Medieval Rome*, ed. Eamonn O'Carragain and Carol Neuman de Vegvar, Aldershot 2007, pp. 13–49.

19 For *ad martyres*, see Geertman 1975, p. 137; for *Sanctae Mariae ad martyres*, see, for instance, Duchesne 1886–1957, vol. 1, p. 343; Davis-Weyer 1989, p. 72; for *Sanctae Mariae Rotundae*, see Geertman 1975, p. 136. See De Blaauw 1994b, p. 14.

20 For these churches, see Richard Krautheimer, *Corpus basilicarum christianarum Romae*, Vatican City, 1937–1977, 5 vols.; vol. 3, pp. 1–60, 65–71; vol. 2, pp. 249–268; Brandenburg 2005, pp. 112–113, 176–189, 224–232.

21 For the text of the *Mirabilia*, see Roberto Valentini and Giuseppe Zucchetti, *Codice Topografico della Città di Roma*, vol. 3, Rome 1946, pp. 3–65. See also Morgan Nichols, trans., *The Marvels of Rome (Mirabilia Urbis Romae)*, 2nd ed. New York 1986, p. 22. On this source, see Dale Kinney, "Fact and Fable in the Mirabilia Urbis Romae," in O'Carragain and Neuman de Vegvar 2007, pp. 235–253.

22 Richard Krautheimer, "Sancta Maria Rotunda," in *Arte del primo millennio*, ed. Edoardo Aslan, Turin 1953, pp. 21–27. For the centralized church and its symbolic relationship to the Virgin Mary in the Middle Ages and Renaissance, see Rudolf Wittkower, *Architectural Principles in the Age of Humanism*, 4th ed. rev., New York 1988, p. 40; Staale Sinding Larsen, "Some Functional and Iconographical Aspects of the Centralized Church in the Italian Renaissance," *Acta ad Archaeologiam et Artium Historiam Pertinentia* 2, 1965, pp. 203–252.

23 Carlo Bertelli, "La Madonna del Pantheon," *Bolletino d'arte* 46, 1961, pp. 24–32; S. Ensoli and E. La Rocca, *Aurea Roma: dalla città pagana alla città cristiana*, Rome, 2000, pp. 661–662 (no.

376).

24 Duchesne 1886–1957, vol. 1, p. 472; Raymond Davis, trans., *The Lives of the Eighth-Century Popes (Liber Pontificalis)*, Liverpool 1992, p. 95.

25 Hans Belting, *Likeness and Presence: A History of the Image before the Era of Art*, Chicago 1994, pp. 121–122; Gerhard Wolf, *Salus Populi Romani. Die Geschichte römischer Kultbilder im Mittelalter*, Weinheim 1990, pp. 128–130; Erik Thunø, "The Cult of the Virgin, Icons and Relics in Early Medieval Rome A Semiotic Approach," *Acta ad archaeologiam et artium historiam pertinentiam* 27, 2003, pp. 79–101.

26 J. Von Pflugk-Harttung, ed., in *Acta pontificum romanorum inedita*, 3 vols., Stuttgart 1888, vol. 3, p. 123; De Blaauw 1994b, pp. 14, 25–26. See also Theodor Klauser, "Rom und der Kult der Gottesmutter Maria," *Jahrbuch für Antike und Christentum* 15, 1972, pp. 120–135.

27 Richard Krautheimer, *Early Christian and Byzantine Architecture*, 4th rev. ed, Hammondsworth 1986, pp. 60–64; J. B. Ward-Perkins, *Roman Imperial Architecture*, rev. ed., London 1994, pp. 424–426; Charles B. McClendon, *The Origins of Medieval Architecture*, New Haven 2005, pp. 8, 72; Brandenburg 2005, pp. 60–63, 73–78.

28 McClendon 2005, pp. 70–72.

29 Krautheimer 1953, p. 21; Krautheimer 1986, pp. 269–273.

30 Krautheimer 1953, pp. 21–22. As examples of such, Krautheimer mentions a chapel at Centula (790–799), one at Würzburg (780), one at Altötting near Munich (877), and one, also from the ninth century, at Ludwigstadt. See also McClendon 2005, pp. 154–155.

31 Jacobus De Voragine, *The Golden Legend: Readings on the Saints*, trans. William Granger Ryan, 2 vols., Princeton 1993; vol. 2, 272.

32 On these churches, see Krautheimer 1937–1977, vol. 1, 137–143; vol. 2, pp. 249–268; Brandenburg 2005, 222–234. On the Forum Romanum and its early medieval churches, see Bauer 1996, pp. 62–72; Meneghini and Santangeli Valenzani 2004, pp. 157–175.

33 De Blaauw, 1994b, pp. 16–17, who – like Davis-Weyer before him – assumes that the altar was placed in the southwestern part of the central space of the church; Davis-Weyer 1989, pp. 61–81, esp.

77–78; Brandenburg 2005, pp. 200–213.

34 Walafried Strabo, “De ecclesiasticarum rerum exordiis et incrementis,” in *Capitularia regum francorum, legum sectio II*, ed. Alfred Boretius and Viktor Krause, Monumenta Germaniae Historica, 2 vols., Hannover 1883–1897; vol. 2, p. 478; De Blaauw 1994b, p. 20.

35 De Blaauw 1994b, pp. 15–19. See also Sible De Blaauw, *Cultus et Decor. Liturgia e architettura nella Roma tardoantica e medievale*, Vatican City 1994, pp. 466–470.

36 De Blaauw 1994b, p. 19. On the S. Stefano Rotondo mosaic, see Davis-Weyer 1989, pp. 61–81; Giuseppe Basile, “Il restauro del mosaico di S. Stefano Rotondo a Roma,” *Arte medievale*, 2nd ser., no. 1, 1993, pp. 197–204.

37 Duchesne 1886–1957, vol. 1, pp. 363, 514; vol. 2, pp. 83; Davis trans. 1992, p. 172.

38 Duchesne 1886–1957, vol. 1, p. 261; De Blaauw 1994b, p. 18.

39 De Blaauw 1994b, p. 22; Pasquali 1996a, p. 41.

40 Antonio Muñoz, “La decorazione medioevale del Pantheon,” *Nuovo bulletino di archeologia cristiana*, 18, 1912, pp. 25–35; De Blaauw 1994b, pp. 21–25; see also Tod A. Marder, “Specchi’s High Altar for the Pantheon and the Statues by Cametti and Moderati,” *Burlington Magazine*, 122, 1980, pp. 30–40.

41 Sible De Blaauw, “Papst und Purpur. Porphyr in frühen Kirchenausstattungen in Rom,” *Tesserae*, Festschrift für Josef Engemann, Münster 1991, pp. 36–51.

42 De Blaauw 1994a, vol. 2, pp. 530–556.

43 John Patrick Donnelly, “To Close a Giant Eye: The Pantheon, 1591,” *Archivium Historiae Pontificiae* 24, 1986, pp. 377–384.

44 For the text of the *Mirabilibus*, see Valentini and Zucchetti 1946, pp. 137–167, esp. pp. 158–159; Master Gregorius, *The Marvels of Rome*, trans. with commentary by John Osborne, Toronto 1987, pp. 29–30, 76–79, including a critical commentary on the statues mentioned by Gregorius.

45 Duchesne 1886–1957, vol. 1, pp. 343; vol. 2, p. 419; Paul the Deacon repr. 1974, pp. 223–224; John the Deacon repr. 1999. See also Frank G. Moore, "The Gilt Bronze Tiles of the Pantheon," *American Journal of Archaeology* 3, 1899, pp. 40–43; P. Tomei, "Le vicende del rivestimento della cupola del Pantheon," *Bollettino d'arte* 32, 1938, pp. 31–39.

46 Michael Viktor Schwarz, "Eine frühmittelalterliche Umgestaltung der Pantheon-Vorhalle," *Römisches Jahrbuch der Bibliotheca Hertziana* 26, 1990, pp. 1–29, especially pp. 8–10. For the inscription concerning the campanile, see Licht 1968, pp. 240, 312 (n. 10).

47 Valentini and Zucchetti 1946, p. 45; Nichols 1986, p. 37. See also Noberto Gramaccini, *Mirabilia. Das Nachleben antiker Statuen vor der Renaissance*, Mainz 1996, pp. 163–165.

48 Schwartz 1990, pp. 4–18. The literature on spolia is vast, but for a classic article and for the most recent contributions see, for instance, Arnold Esch, "Spolien: Zur Wiederverwendung antiker Baustücke und Skulpturen im Mittelalterlichen Italien," *Archiv für Kulturgeschichte* 51, 1969, pp. 1–64; Dale Kinney, "The Concept of Spolia," *A Companion to Medieval Art*, ed. Conrad Rudolph, Oxford 2006, pp. 233–252, with discussion of historiography and extensive bibliography.

49 Schwartz 1990, p. 19.

50 Schwartz 1990, p. 20. As other examples of the same type of portico, Schwartz also mentions one from the sixth or seventh century in the Church of S. Thekla in Asia Minor, and one from the sixth century in the Baptistery of Hagia Sophia (pp. 19–22). For the Studios Church, see also Krautheimer 1986, pp. 104–105; Thomas Mathews, *The Early Churches of Constantinople: Architecture and Liturgy*, University Park/London 1971, pp. 19–21, and Thomas Mathews, *The Byzantine Churches of Istanbul*, University Park 1976, pp. 143–158.

51 Schwartz 1990, p. 28. On "eastern" influence on the architecture of Rome in the sixth and seventh centuries, see Krautheimer 1980, pp. 89–108; Krautheimer 1986, pp. 268–273.

52 Doris Gruben and Gottfried Gruben, "Die Türe des Pantheon," *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung* 104, 1997, pp. 3–74.

53 Geertman 1975, pp. 132–142; De Blaauw 1994b, p. 14.

54 Geertman 1975, pp. 195–197; De Blaauw 1994b, p. 15. On stational liturgy in Rome, see also John F. Baldovin, *The Urban Character of Christian Worship*, Rome 1987, and Magnuson 2004, p. 73.

55 De Blaauw 1994b, 14–15; Krautheimer 1980, pp. 57–58.

56 Louis Duchesne and Paul Fabre, eds., *Le Liber Censuum de l'Eglise*, 3 vols., Paris 1910; vol. 2, pp. 157; De Blaauw 1994b, p. 15.

57 De Blaauw 1994b, p. 15.

Nine Impressions of the Pantheon in the Renaissance

Arnold Nesselrath

No building could have embodied Renaissance principles of ideal architecture more fully than the Pantheon: in addition to being the best-preserved temple from antiquity, the perfect specimen of antique architecture is even a circular central-plan building. The clarity of the stereometric forms of sphere and cylinder, dome and drum, as well as the proportions of diameter and height, had been preserved intact because of its transformation into a Christian church. The Pantheon far surpassed the grandeur of the only other ancient temple of Rome that still stood largely complete, the much smaller Temple of Portunus or – to use the name given to it after its conversion to its new function – the church of S. Maria Egiziaca in the former Forum Boarium.[1] Here, the intercolumniations of its portico had been bricked up and closed, and its interior was drastically altered, so that the effect of the whole building no longer recalled the ancient temple it once was. The contrast between the bare undecorated brick exterior of the Pantheon, which at first sight raises no expectations other than the usual ruins of ancient buildings, and the interior, into which the solemn broad columnar portico invites us and the massive bronze doors admit us, has an astonishing effect on the person entering. The visitor experiences something like a sudden *parousia,* with a single source of light flooding through the open oculus in the center of the dome, where all of the structural forces and sight lines converge. The Corinthian order of columns and pilasters define and articulate the wall encircling the whole inner space of the Pantheon. The use of an order permitted – also in the primary sense of the word – the development of a homogeneous architectural system in which the curved oblong and semicircular alcoves with their corners and angles and the aedicules could be harmoniously incorporated and fully integrated.[2]

In the interior of the Pantheon the much-prized richness of ancient marble incrustation was still largely preserved; the polychromy and the variety of marbles employed were unrivaled and, even after the decline and fall of the Roman Empire, they continued to conjure up its former greatness.[3] This ideal view of the building was perhaps best expressed in an undated quotation attributed to Bramante. On receiving the commission for the new St. Peter’s, the first church of Christendom, he is said to have summed up his plan for the program by saying that he wanted to place the Pantheon on top of the Templum Pacis, that is, the Basilica of Constantine.[4]

Other artists expressed their admiration for the ancient central-plan building of the Pantheon by choosing it as the site for their own burial. A clear statement is also expressed by this practice:[5] as they anticipated resurrection under the coffered dome with its central oculus, they linked the temple reputedly consecrated to all the pagan gods with the eternity of their own Christian faith. They thus took a personal part in exorcizing the Pantheon.[6] Reflecting his archaeological investigations and projects in Rome, Raphael was one of the first artists to be buried here;[7] he was followed by his betrothed Maria Bibbiena[8] and by friends, disciples, assistants, and followers such as Baldassare Peruzzi,[9] Perino del Vaga,[10] and Giovanni da Udine[11] up to Annibale Carracci,[12] as well as Taddeo Zuccari,[13] Vignola,[14] and Flaminio Vacca.[15] These Renaissance artists thus founded the tradition of an

abstract idea and created the metaphorical meaning of *pantheon* as a building serving as the memorial of the famous dead: a shrine honoring great men and women.

On the Appearance of the Pantheon in the Renaissance

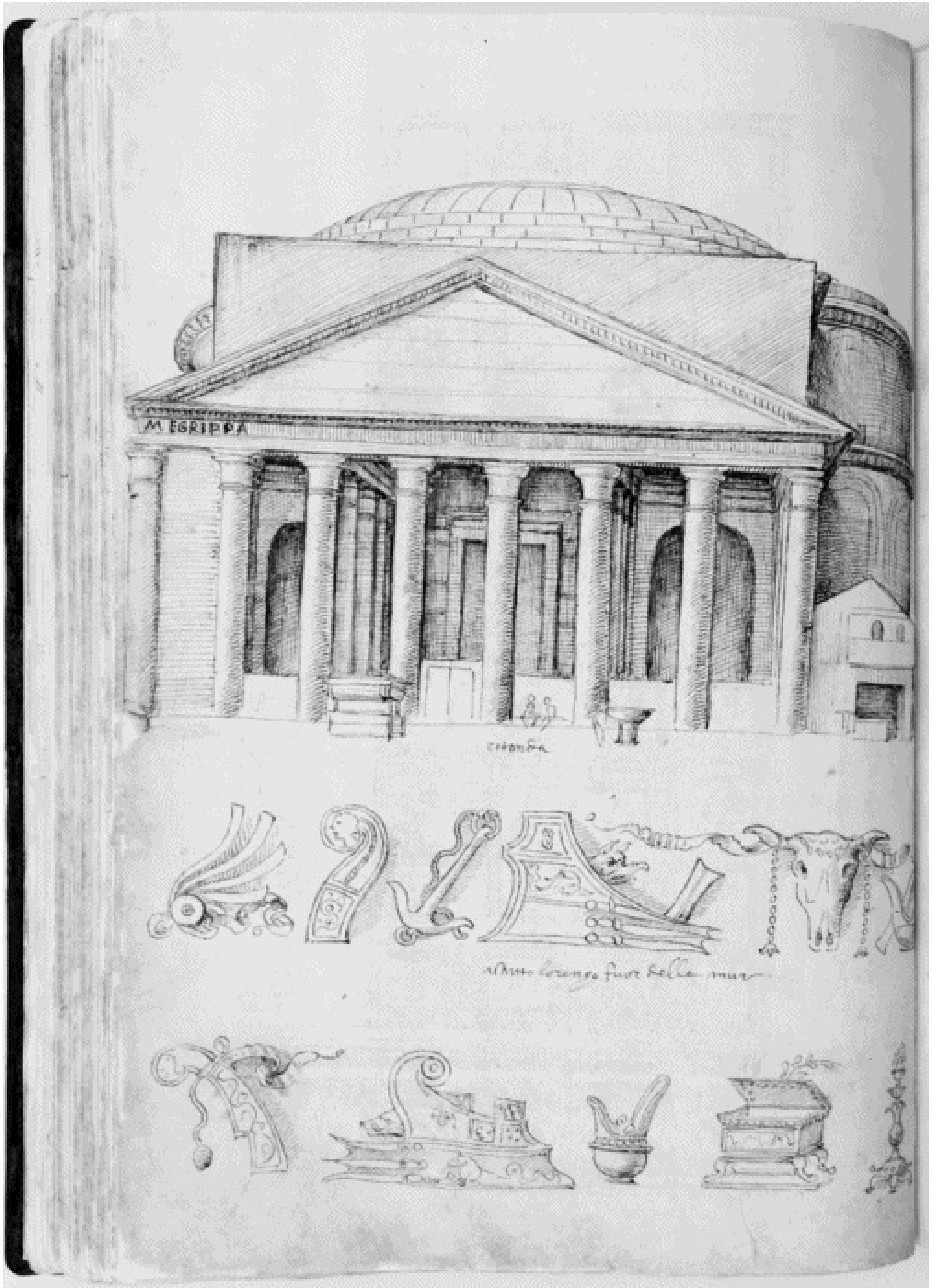
It is precisely the *ideal* image of the Pantheon that the draftsmen, the engravers, and the authors of treatises of that period helped to disseminate. Yet the impression that the Renaissance spectator gained on entering the building was quite the opposite of this ideal. As with all reused ancient temples, its appearance had been drastically altered by its transformation into a Christian church or, rather, as a consequence of that operation. Even if the consummate proportions could not be upset by this development, the overall impression of what had once been the ancient cella below the dome had been fractured by the altar layout before the main apse, consisting of a *ciborium* contained within a kind of columnar screen or pergola, and by the fragmented use of the interior space. The alcoves, tabernacles, and annexes that formally determine the wall rhythm of the rotunda were isolated by their new liturgical functions: each was individually formed, each had its own altar and focal point, and to each was assigned its own individual dedication.

With their numerous altars and with their use as side chapels against or behind the ancient wall, the alcoves generated through their chronologically, stylistically, or chromatically miscellaneous arrangement an altogether heterogeneous impression of the interior, permitting only a faint sense of the uniform concept of the ancient temple to remain. In its transformation, the damage caused to the fabric, original decoration, and marble incrustation of the walls was serious. Even the patterns of the original pavement were upset and interrupted with the insertion of tombstones. Raphael's famous drawing in the Uffizi (see Fig. 1.16) thus suggests an image of the Pantheon[16] that did not correspond to its actual condition at the time. Although numerous other representations seem to reinforce this image, the appearance of the ancient interior, intact as represented in this drawing, in no way corresponded to what the visitor would have seen around 1506 and already long before.

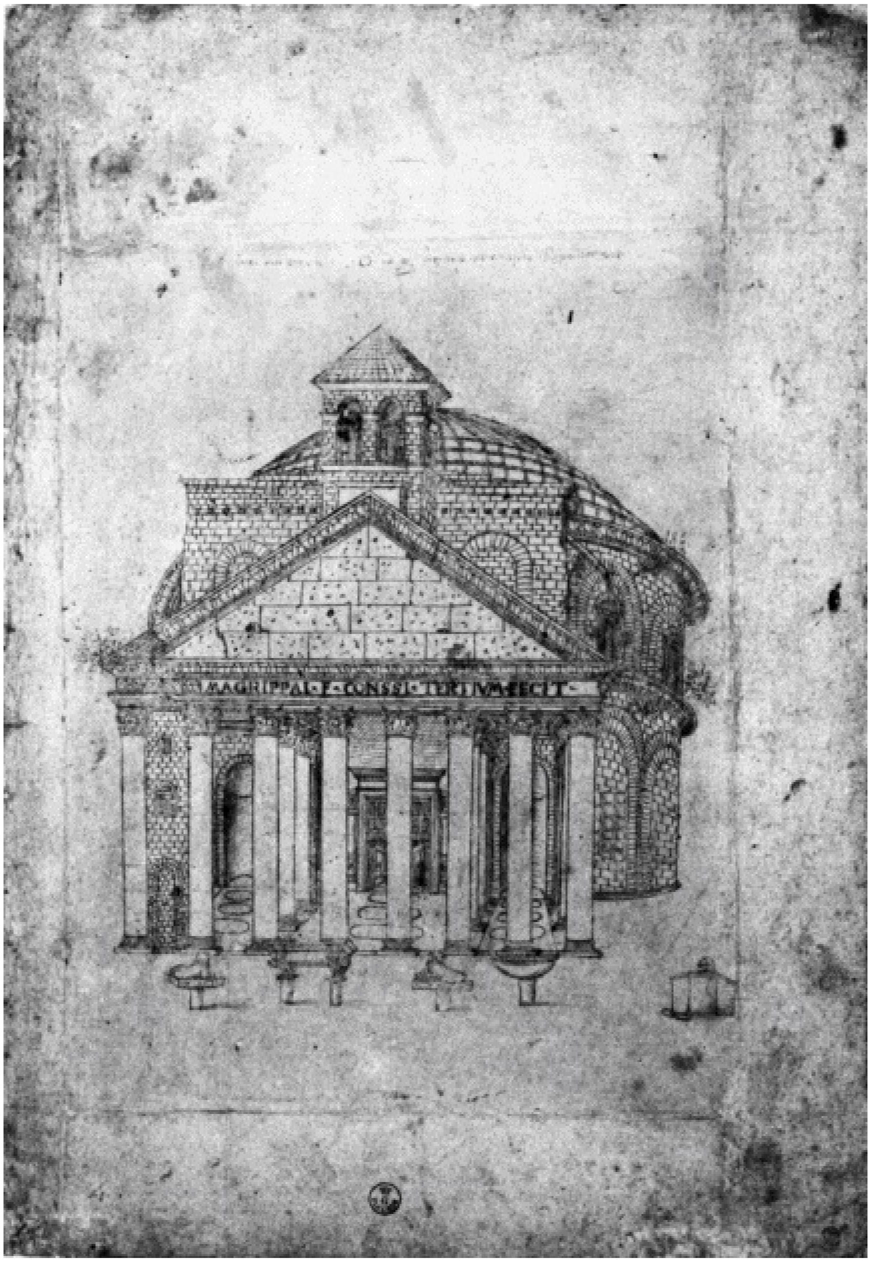
After the ancient temple had been abandoned and then transformed into a Christian church in the early seventh century, and after it had been used as a church in subsequent centuries, larger and smaller additions built into it had altered the original appearance of the Pantheon considerably. Moreover, the ancient statues with their three-dimensional qualities, which would have engaged with the architectural system and complemented the symmetry of the interior, were by now replaced by flat paintings positioned mainly over the altars in the alcoves or aedicules and executed in part in the form of frescoes.[17] Although the dedication to "Sancta Maria ad Martyres" was frequently used to refer to the building, the alternative "Santa Maria Rotonda" alluded to its architectural form and perhaps its ancient origin. Indeed, the liturgical furnishings for its new cult found hardly any visual record until the seventeenth century.

The same could be said, although to a lesser degree, of the exterior. The Pantheon is situated in the Campo Marzio, a quarter of Rome that remained inhabited even in periods when the population of the city declined.[18] The piazza in front of it was somewhat smaller before its baroque remodeling; the streets around the building were narrower, and the medieval houses crowded closer to the Rotunda than the buildings now surrounding it. The left (east) flank of the columnar portico had been destroyed. The corner of the pediment, the corresponding row of columns, or at least their capitals, and the roof had here collapsed, and a temporary retaining wall filled the entire intercolumniation

(Fig. 9.1) to shore up the porch. The other intercolumniations had been partly blocked with low retaining walls, both to defend against floods and to demarcate the various activities transacted there. The portico was a popular place for an extraordinary variety of functions and, as such, was repeatedly invaded by unauthorized structures and uses.[19] The roof of the portico was topped by a squat medieval belfry (Fig. 9.2). These visual documents illustrate this situation only from a relatively late date, principally the sixteenth century. The first image, one of the earliest *vedute*, is found in the famous Codex Escurialensis. It shows the walled-in intercolumniations. Unfortunately, however, it did not copy the view in every detail and thus fails to give a full impression of the Pantheon's exterior at the time.[20] Another drawing by an anonymous hand, perhaps dating to the mid sixteenth century and now in Paris, gives a fuller record of the monument and shows in an impressive way how the Pantheon had gradually merged into its quarter and its surrounding structures (see Fig. 1.7).[21] When this sheet was drawn, the Piazza della Rotonda had already been adorned and articulated with the antiquities installed there during the Middle Ages: namely, the two Egyptian lions, the large porphyry tub, and the round porphyry bowl, documented there at least since the twelfth or thirteenth centuries and described by the famous Master Gregorius.[22] They are mentioned again in the time of Pope Eugenius IV around 1444,[23] and Pope Leo X commissioned them to be reinstalled between 1517 and 1520 in the way they are shown in the drawing.[24]



9.1. Exterior view of the Pantheon; hand of the Anonymous Escurialensis, sixteenth century. (Codex Escurialensis, fol. 43 v, Monastery of El Escorial, Spain)

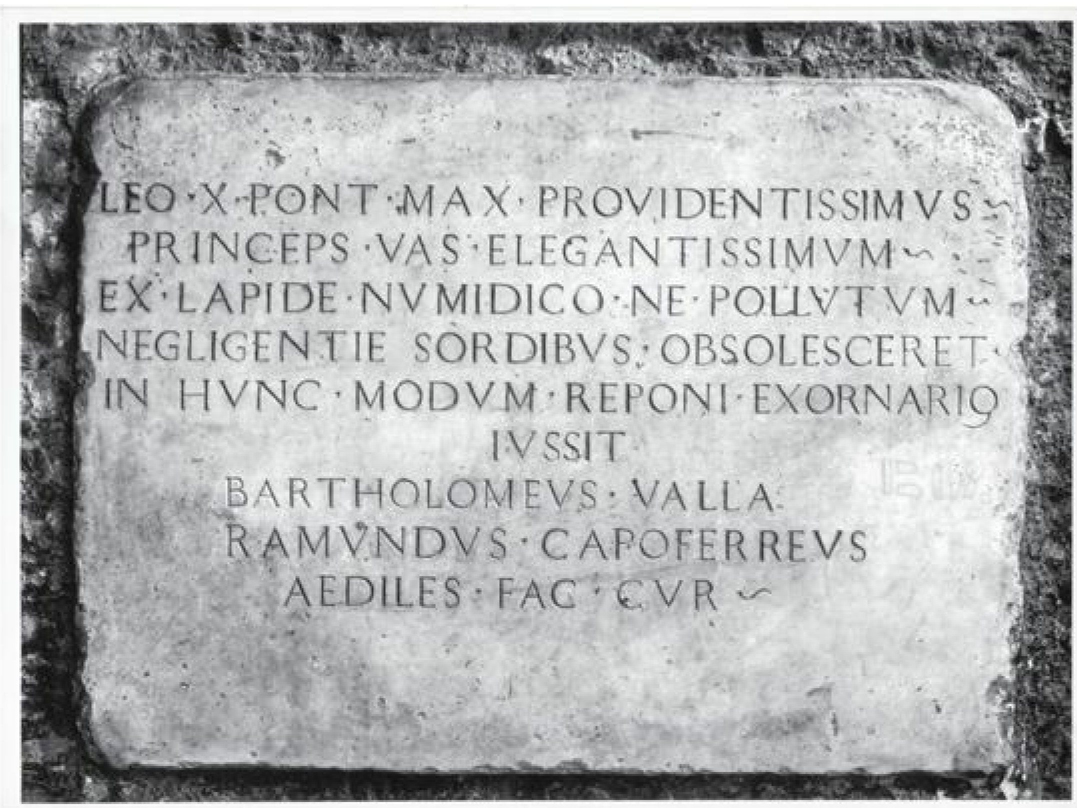


9.2. Exterior view of the Pantheon; drawing from circle of Baldassare Peruzzi. (Uffizi A 160 r, Uffizi Gallery. Copyright: Soprintendenza Speciale per il Polo Museale Fiorentino)

The sculptures were separately displayed on rather unprepossessing squat pedestals. The feet of the porphyry tub stood on two marble panels decorated in relief, and inscriptions (Fig. 9.3 a and b), now walled into the portico, commemorated the Leonine installation of the ensemble.[25] The *veduta* ("view") of the Pantheon exterior from the Uffizi by an assistant of Baldassare Peruzzi (Fig. 9.2),[26] is earlier than the drawing in the Escorial. The embarrassment or indecisiveness of the Uffizi draftsman is apparent. On the one hand, the drawing tries to provide a really precise impression of the situation after the installation of the antiquities in front of it by Leo X. On the other hand, it highlights and isolates the ancient building and the antique sculptures. The stonework is represented rather coarsely, although the ashlar of the tympanum is represented in detail. In order to reveal the floor of the portico, the artist has deliberately omitted the low retaining walls in the lower part of the intercolumniations, which are especially clear in the somewhat later views of the interior of the portico by an anonymous Netherlandish draftsman (see Fig. 1.4).[27]

(a)

(b)



9.3 a and b. Marble reliefs in the entrance hall of the Pantheon; Roman sculptor from the early sixteenth century. (Ministero per i Beni e le Attività Culturali, Instituto Centrale per il Catalogo e la Documentazione [ICCD])

Today, as a result of modern restoration, and especially the partial reconstitution of the original upper story,[28] the interior of the Pantheon more closely resembles Raphael's drawing, which

attempted to reconstruct the interior in its original state. Given these modern changes, there is almost nothing left on site to inspire any appreciation of the young artist's achievement, which envisioned a reconstruction that is as valid today as it was in his own day. Comparing the present situation of the interior cella with Raphael's drawing of 1506, we might miss the effort that was required to develop such a clear distinction between antique and Christian arrangement of the space. Endless discussions of the drawing in art historical literature, including the strange resistance to John Shearman's subtle interpretation,[29] make particularly evident what Raphael has accomplished. If we were to reverse the artist's mental process, we would arrive at a wholly different appearance of the Pantheon cella reflecting the use of the interior in the Middle Ages and Renaissance. Relying instead on surviving remains and subtracting traces of the Christian redecoration, which were added to the interior in the course of history and of which fragments can still be found, we are even able to arrive at a quite specific idea of what the draftsman saw.

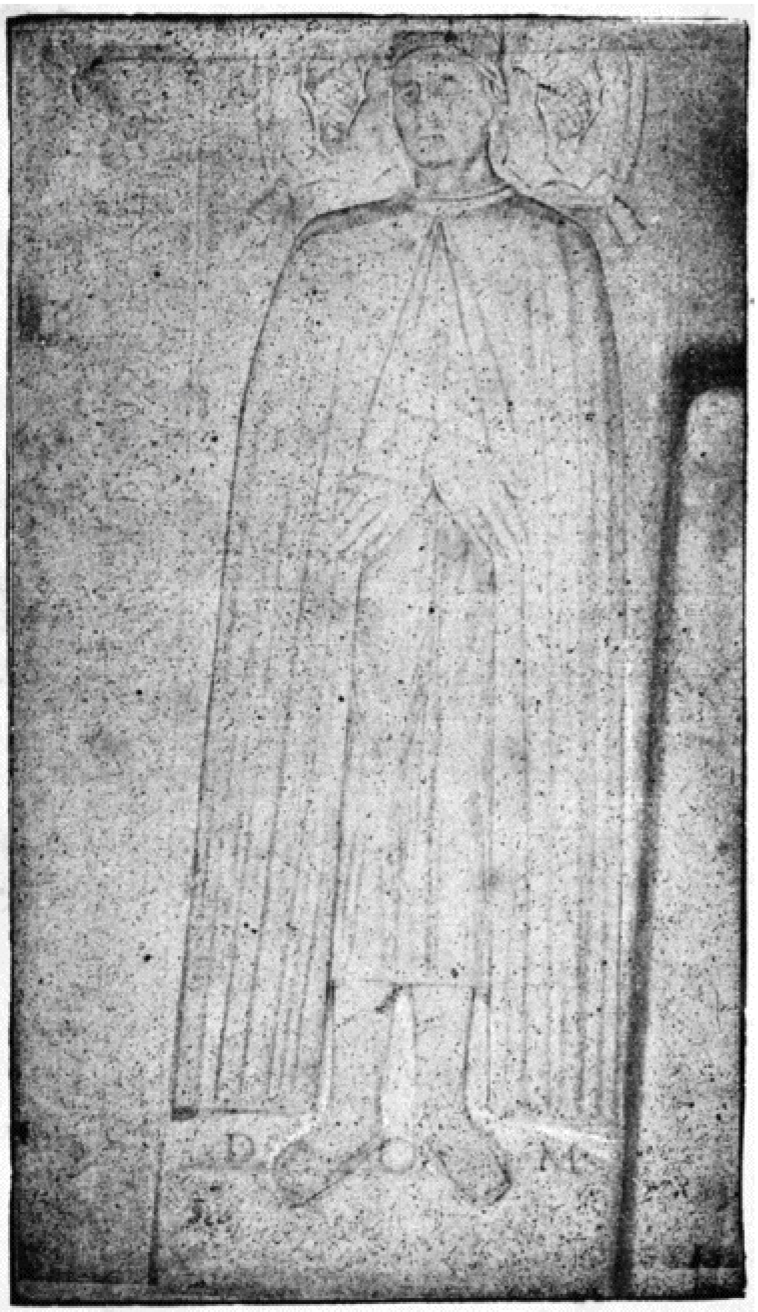
One of the earliest remains of the medieval decoration to survive is a fresco of the *Coronation of the Virgin*, presumably dating to the fourteenth century, in the second aedicule to the right of the entrance (Fig. 9.4).[30] It was simply painted as an altarpiece in the ready-made architectural frame. Another fresco, roughly the same in date, had survived until the beginning of twentieth century in the semicircular alcove on the east side of the building's transverse axis. Here, a chapel dedicated to St. Thomas was installed. It was destroyed at the beginning of the last century to make way for the funerary monument of King Umberto I (see Chapter Twelve). The imagery showed a blessing Christ in a mandorla. Kneeling before him to the left was a female figure, supporting her head with her left hand in a melancholic pose. On the right side stood a bearded saint, perhaps St. Peter. A further fragment of fresco, which might have dated as early as the twelfth century, was also destroyed to make way for the royal monument.[31]

9.4. Second aedicule to the right of the entrance; Trecento fresco of the *Coronation of the Virgin*. (Ministero per i Beni e le Attività Culturali, Istituto Centrale per il Catalogo e la Documentazione [ICCD])

The first side chapel to the right of the entrance was created in one of the oblong alcoves situated on a diagonal axis of the Pantheon. It is dedicated to St. Boniface IV, the pope who converted the Pantheon into a Christian church. Nearly three times broader than it is deep, the proportions of the chapel seem awkward for liturgical functions. Its back wall is articulated with three rectangular niches, whose original architectural decoration is lacking as is the marble incrustation of the whole alcove. The central niche of the chapel, aligned with the central intercolumniation, is painted with a fresco of the *Annunciation*. The artist belonged to the circle of Melozzo da Forlì or Antoniazzo Romano, and thus the mural can be dated to the last quarter of the fifteenth century.[32]

The next diagonal alcove on the right has the same oblong shape as the first. It continues to serve as the chapel of S. Maria della Clemenza. The altarpiece is similarly placed in the central niche of the alcove. It consists of a fresco of the enthroned Madonna between St. John the Baptist and St Francis of Assisi. Dating to the late fifteenth or early sixteenth century, it is attributed to an Umbro-

Latian follower of Antoniazzo Romano.[33] Two tombstones have remained in situ in this alcove: one, dating to the early years of the fifteenth century, is the tomb of the lawyer Paolo Scocciapile (Fig. 9.5); the other is dedicated to the memory of a certain Gismonda, who died in 1476.[34] Other tombstones, formerly set into the floor, such as that of Pietro Angelo de Melle and others, in part dating to the fourteenth century, have been restored from fragments and are preserved in the Pantheon.[35] As in almost all Roman churches, such marble bas-reliefs were inserted into the pavement of the Pantheon without sparing its ancient pattern of circles and squares. These elements have now been generally removed, and the floor has been reconstructed in the original pattern almost everywhere.



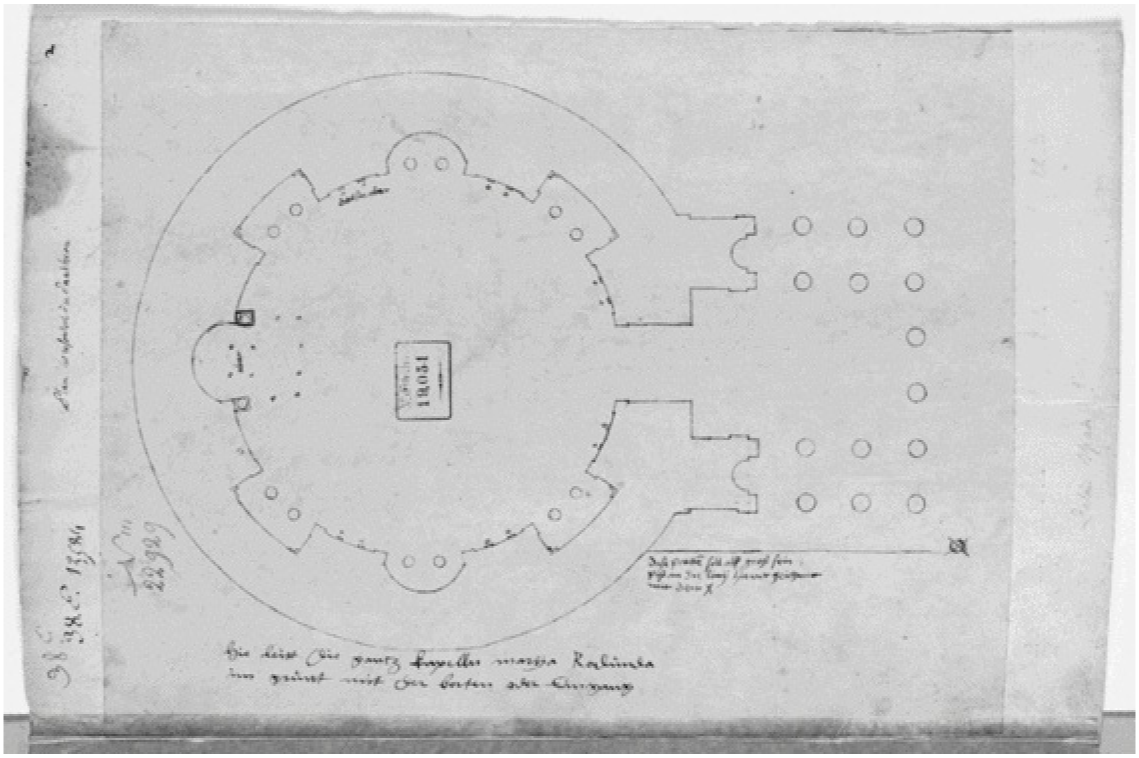
9.5. Grave of the lawyer Paolo Scocciapile, third alcove to the right of the entrance, early fifteenth century. (Ministero per i Beni e le Attività Culturali, Istituto Centrale per il Catalogo e la Documentazione [ICCD]).

What has not survived of the medieval decoration, on the other hand, are the ciborium over the high altar, supported by four porphyry columns, and the surrounding columnar screen or pergola,

supported in turn by another six porphyry columns. Placed on the central axis and projecting into the rotunda, this pergola would have been the first feature to strike the eye of anyone entering the Pantheon. From this feature, the visitor would have immediately recognized that the ancient cella had been transformed into a Christian sanctuary. Raphael preferred to exclude from his drawing such elements that characterized and obstructed the interior at the start of the sixteenth century, and he simply did not record them. Instead, he tried in his mind's eye to reconstruct the pagan state of the temple interior in restored form in his Uffizi drawing (Fig. 1.16). To produce this impression on his sheet, he had to walk around the inside of the Pantheon in order to look from behind the altar screen. Presumably, this detour explains why the interior view of the Rotunda was drawn in two separate installments, giving rise to the well-known error[36] that led him to omit a whole alcove with its massive columns and a part of the wall with its pedimented aedicule. In other words, Raphael combined two separate elevations in his drawing. To draw both parts of the elevation, he needed observations from different standpoints from which he could look behind the medieval altar screen; in the process, he omitted a third portion of the elevation that would have completed his view of one side of the interior.[37]

In his altarpiece for the Cappella Dei in S. Spirito in Florence, the*Madonna del Baldacchino*, dating from 1508, Raphael succeeded in evoking an imaginative reconstruction of the Pantheon interior, using the motif of the main apse as a niche for a *sacra conversazione*.[38] Although he again represented the original antique state of the architecture and used it as a background, the Virgin and Child take the place of the medieval high altar: sitting on the throne of an antique statue of Jupiter[39] she holds the Christ Child in her lap as the Mother of the true God.

So far as we know, only one Renaissance draftsman, namely, the Nuremberg artist Hermann Vischer the Younger (ca. 1486–1517), recorded the medieval layout of the cella with ciborium and altar screen, at least in a plan (Fig. 9.6). The drawing is dated 1515. Vischer represented the Pantheon not as an ancient monument but as a Christian church. In the accompanying inscriptions, for example, the ancient name of the building is not mentioned: *Hie leit die gantz kapelln marija Rodunda im grunt mit der borten oder Eingang*.[40] Along with the high altar, the aedicules are also expressly described as altars: *das sin altar*.

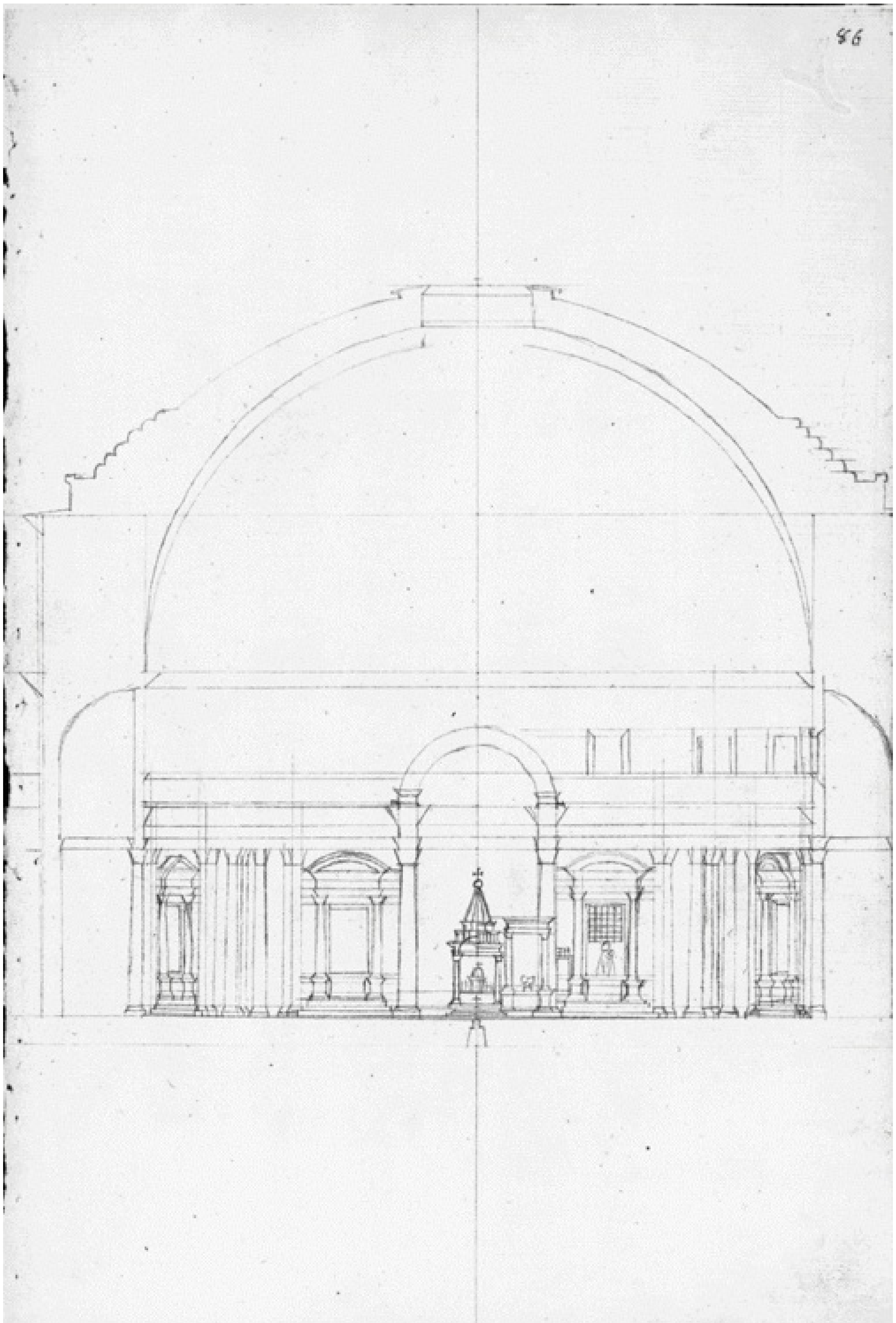


9.6. Ground plan of Pantheon; drawing by Hermann Vischer, sixteenth century. (The Louvre, inv. 19051 verso. Photograph: RMN-Grand Palais/Art Resource, NY)

A few later sources document the central altar setting in greater detail. In 1588, Pompeo Ugonio described its elevations and the varieties of precious marbles used in its incrustation.[41] Giovan Carlo Valloni provided similar information in 1670.[42] The report by Giovanni Antonio Bruzi dating to the second half of the seventeenth century is still more detailed, comprising even the inscriptions.[43] The literary descriptions are closely matched by the visual documentation. The well-known orthogonal elevations and ground plan (see Fig. 10.7 and Plate V), drawn by a contemporary of Gian Lorenzo Bernini and produced as part of Pope Alexander VII's proposed remodeling of the Pantheon,[44] enable us to determine the dimensions of the altar screen.[45] From the pasted-on flap in these drawings showing the section of the pergola, we can clearly see what had obstructed Raphael's observation of the interior in 1506 and how far he had to walk around it to see and be able to draw the aedicule that lay hidden behind it.

A similar orthogonal section through the Pantheon in the Raccolta Martinelli in Milan (Fig. 9.7) represents the pergola even more precisely.[46] Since the sheet belongs to a series also comprising an elevation of the facade with the two belfries added by Urban VIII,[47] this section should not be dated earlier than the surveys and projects from the Bernini shop. The section in question analyzes the altar setting in a very precise way. It thus records the right side of the two presumably symmetrical ambones, or reading desks, as described by Bruzi, and also shows the elevation and section of the altar ciborium. According to a marble inscription on the screen, the altar pergola was donated by Stephanus Philippi[48] and thus may perhaps date back to the Pantheon's consecration as a church.[49] The ciborium, however, is significantly later, since descriptions of it mention coats of arms and inscriptions on it that record Pope Innocent VIII as the patron of a renovation of the central feature of the altar layout and its installation here in 1491.[50] The print of Giuseppe Tiburzio Vergelli and Pietro Paolo Girelli of 1692[51] confirms the layout of the sanctuary area that existed till the erection of a new

high altar under Clement XI in 1711,[52] but provides us with less detailed information (see Fig. 11.3).



9.7. Section of the Pantheon; drawing by anonymous draftsman of the seventeenth century. (Milan, Civico Gabinetto dei Disegni, Raccolta Martinelli, vol. V, fol. 99 r)

Because the pair of original columns has been replaced by granite columns in the two aedicules with segmental pediments closest to the entrance, it has been inferred that the original porphyry shafts of these aedicules had been used by Innocent VIII and his architects for the new altar ciborium.[53] In fact, the *spolia* were not simply wrenched from their site but carefully replaced by other columns. Instead of the former Composite bases, we now find Attic bases supporting both shafts, while the new shafts themselves were hewn from granite; Corinthian capitals were then added to the shafts of the aedicule to the right (west) of the entrance, but these are later than the Hadrianic originals. On the

aedicule to the left (east) side of the entrance, Corinthian-like acorn-wreath capitals dating to the second half of the first century AD[54] were used. They are at variance with the repertoire of forms of the Pantheon and are clearly spolia.

Since four columns were needed for the support of the ciborium, it may be assumed that its builders did use the Pantheon itself as the source for these materials. It is less probable that the four columns from the aedicules flanking the entrance had also been used in the medieval altar pergola, for it consisted (as we have seen) of six columns, and the spolia from the two aedicules would not have been sufficient. Three copies of a drawing of an aedicule in the Pantheon with a segmental pediment – located respectively in the Codex Escurialensis,[55] in the Royal Institute of British Architects in London (Fig. 9.8),[56] and in the Uffizi[57] – all show Attic bases with acanthus leaf capitals resembling the Corinthian order. If their consistent representation in all three drawings is not overinterpreted, the aedicule represented in these drawings should be one to the left (east) side of the entrance, which would have been spoliated or altered by Innocent VIII shortly after 1491.[58]

9.8. Aedicule in the Pantheon; by anonymous draftsman from the circle of Giuliano da Sangallo. (London, Royal Institute of British Architects, inv. VIII/6)

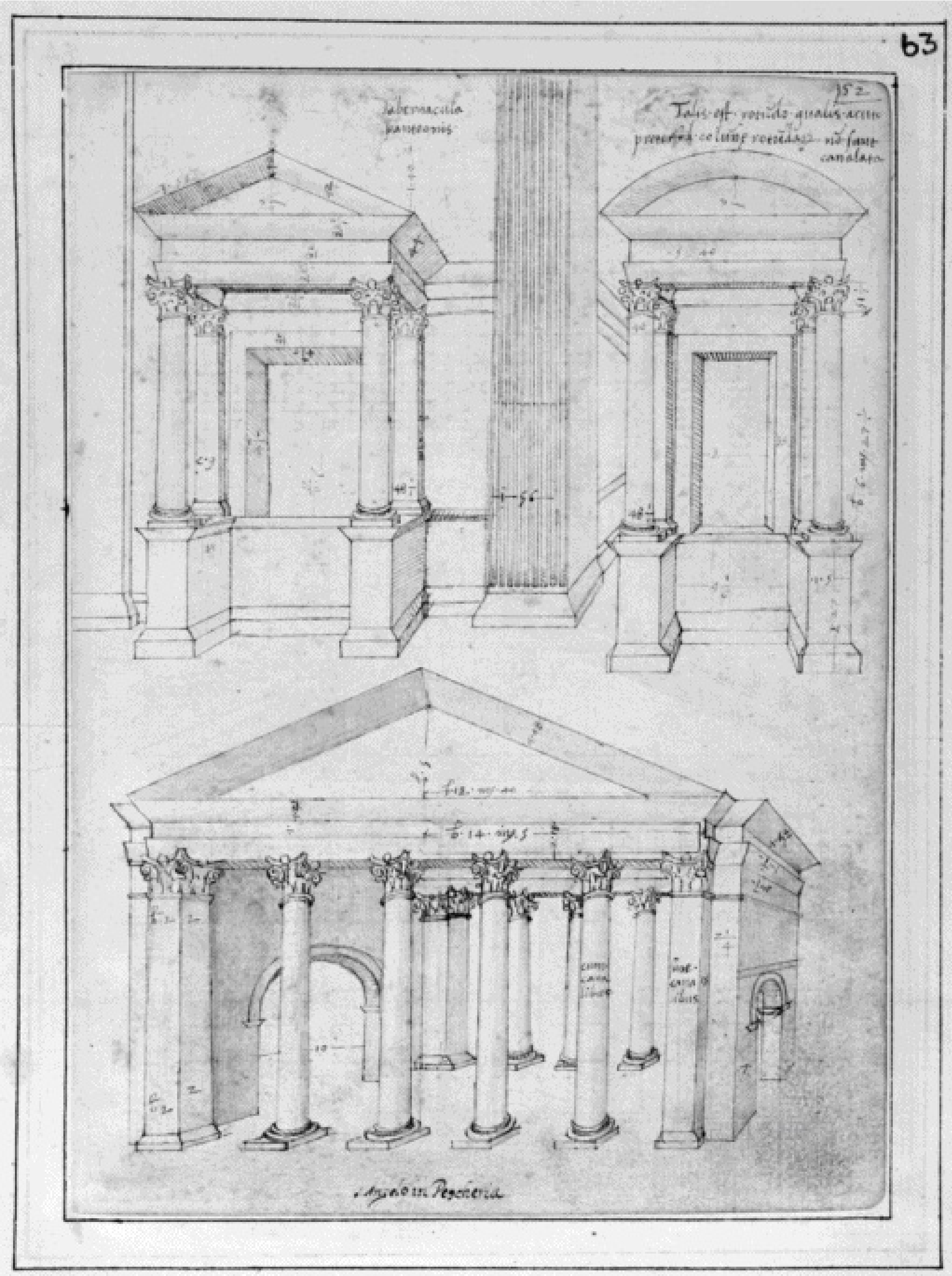
Suddenly, in the aftermath of this spoliation, an active restoration, especially of the aedicules or the tabernacles, began in the early years of the sixteenth century, funded by endowments of the altars. The best-known example in the series is the aedicule containing Raphael's tomb (Fig. 9.9). In his last will and testament, the artist had asked that he be buried in the ancient, now Christianized, building that had been so crucial for his art.[59] The fact that all eight aedicules could be restored and liturgically converted into funerary monuments within just two to three decades perhaps indicates that the Roman Renaissance had reached its artistic but also its economic high point.[60]

9.9. Tomb of Raphael, likely after his own designs. (Alinari/Art Resource, NY)

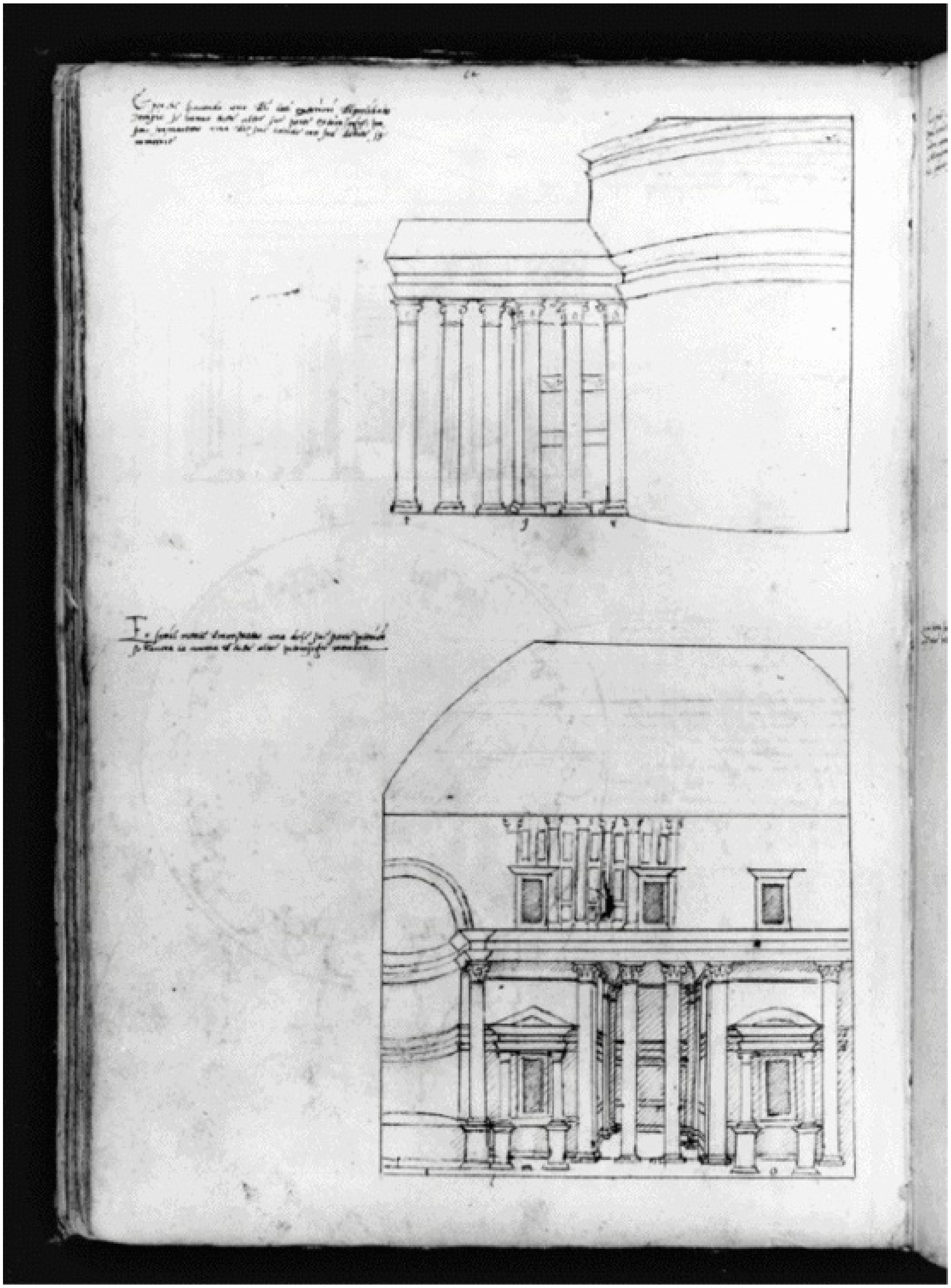
All of the early drawings of the Pantheon, starting with those of Francesco di Giorgio Martini (see Fig.10.5),[61] show the lower part of the tabernacles as an open recess between separate pedestals and not as a closed socle. The earliest known drawing that shows a continuous socle, with the pedestals connected beneath the columns, is a page in the Codex Barberini, a book of drawings assembled by Giuliano da Sangallo (Fig. 9.10).[62] This impressive frontal view is drawn on an enlarged folio of the codex, and so it cannot belong to the early studies in the *Libro*. Given that the individual drawings in the codex are difficult to date,[63] we can only rely on the *terminus ante quem* of Giuliano's death in 1516, that is, within the period of the aedicules's restoration.

9.10. Aedicule from the Pantheon; drawing by Giuliano da Sangallo. (Biblioteca Apostolica Vaticana, Barb. lat. 4424, fol. 27 v)

At about the same time, in the years around 1514, Bernardo della Volpaia represented the triangular and segmental aedicules with an open recess between the pedestals in his so-called Codex Coner (Fig. 9.11),[64] as did Antonio da Faenza in the architectural treatise he wrote between 1520 and 1535 (Fig. 9.12).[65] Toward 1519–1520, the closed socle appears more frequently in drawings after the antique, as for instance in a drawing by Giovanni Francesco da Sangallo datable to this period.[66] By April 1523, work on Raphael's tomb was still in progress, suggesting that the open socle existed until this moment in time. During this period, the statue of the *Madonna del Sasso* (commissioned by Raphael in his will) was installed over the tomb, and that tabernacle, with its segmental pediment, received its present form.[67] Thereafter, the visual records transmit the form familiar to us today in the representations of the aedicules with closed pedestals, as in the book of drawings by Raffaello da Montelupo in Lille.[68]



9.11. Two aedicules from the Pantheon; drawing by Bernardo della Volpaia. (London, Sir John Soane's Museum, Codex Coner, fol. 52 r)

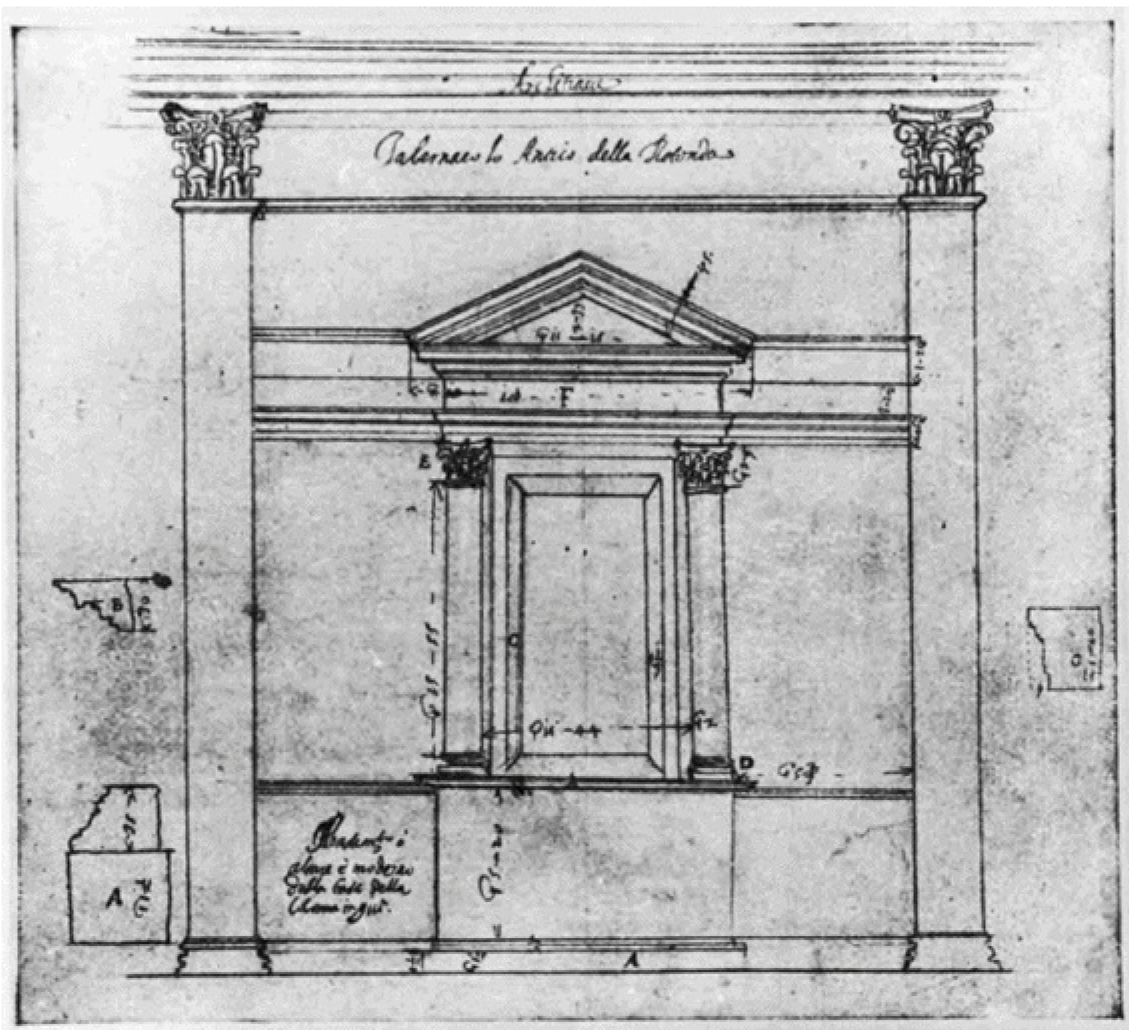


9.12. Flank of the portico and detail of interior elevation; drawing by Antonio da Faenza, 1520–1535. (Private collection. Photo Antonia Weisse)

The alterations of the aedicules can no longer be verified by inspection of the physical evidence, since all eight of the pedestal zones have been damaged by later interventions in the crucial area. A typological comparison with buildings or parts of buildings of the Hadrianic period is complicated by the rarity of such architectural elements, although it can be noticed that the use of pedestals seems more playfully ornamental in character than to follow a strict typological pattern: the classical emphasis of the horizontal member is not always privileged; the intention instead was to experiment with soaring, almost diaphanous-seeming structures.[69]

The original form of the aedicules can best be gauged from the study of drawings after the antique.

Of particular interest is a sheet attributed to Gregor Caronica whose present location is unfortunately unknown (Fig. 9.13). It was contained in a codex, whether an album or a homogeneous book of drawings, dating to 1577 that was owned by O. Baer in Frankfurt before 1940.[70] An inscription on an orthogonal elevation of the lower story of the rotunda showing an aedicule with triangular pediment and its flanking pilasters seems to confirm these observations on the divided pedestals. The draftsman remarked on the sheet: *Il basamento d[ell'] altare è moderno dalla base della colonna in giù* ("The dado of the altar is modern from the base of the column down"). Independently, Pirro Ligorio reported *che i tabernacoli degli altari furono restaurati, l'uno dopo l'altro, a spese di pie persone* ("that the tabernacles of the altars were restored, one after the other, at the expense of pious persons").[71] Both notations may depend on the reports of eyewitnesses or on information from drawings by such people. In opposition to current archaeological thought,[72] therefore, the notations explicitly seem to confirm the information presented by the individual drawings when arranged in a chronological order.



9.13. Aedicule from the Pantheon; drawing by Gregor Caronica of a missing folio from a codex of 1577 whose whereabouts are unknown.

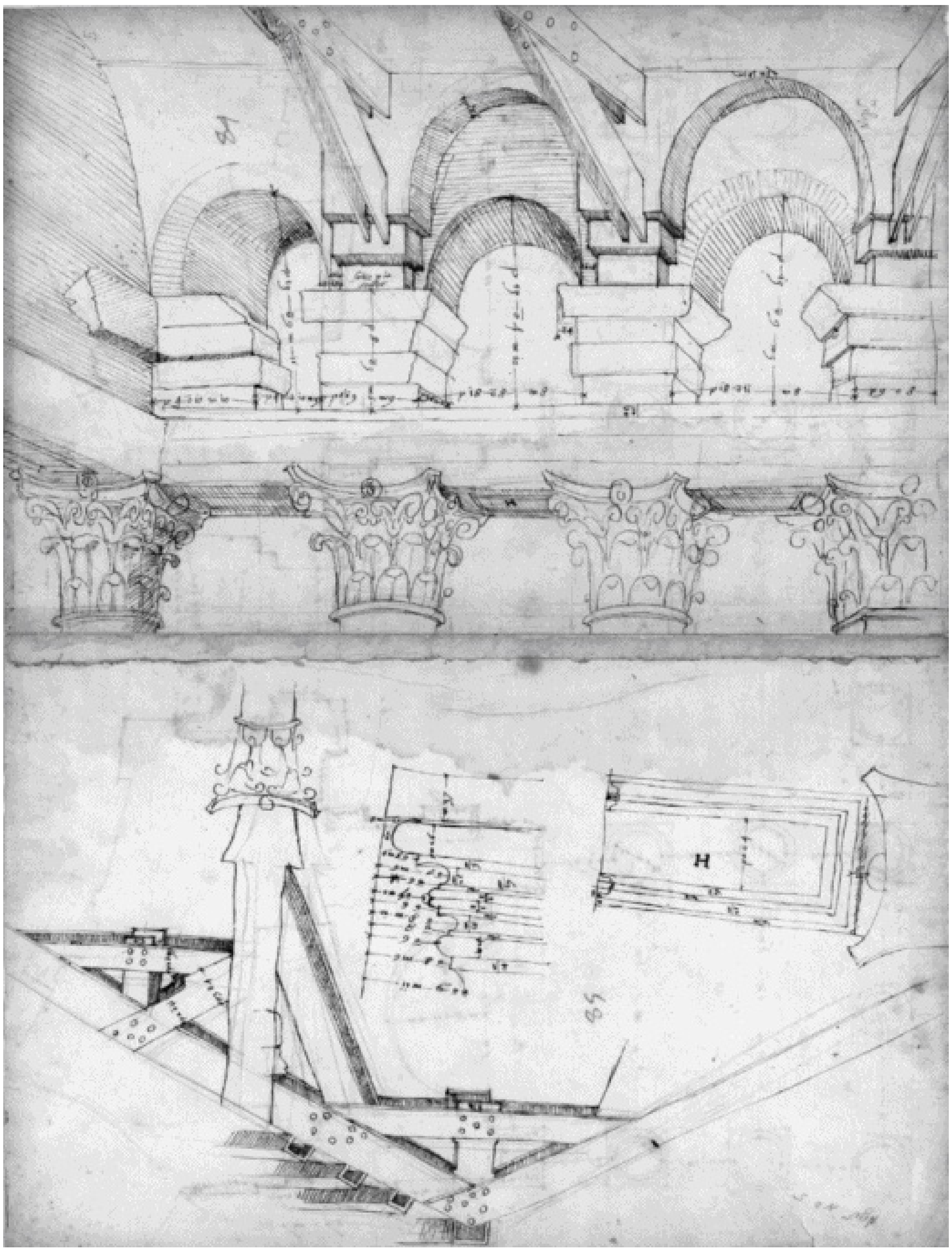
The appearance of the Pantheon today comes close to the ideal image that people in the Renaissance had of it. This fact in turn could mislead us into thinking that the building has survived from antiquity in its present condition. But what seems original and ancient is often an ex post facto reconstruction, based on varying levels of subjective interpretation. Not all interventions in the Pantheon were as spectacular as the installation of the medieval high altar or the alteration of the

tabernacles. A close analysis of the early drawings from the Renaissance can make us aware of alterations and renovations of quite specific details over the centuries, such as the decorative scheme of its polychrome marble incrustation, that deserve continued study to enhance our understanding.[73]

From this point of view, the need for care of the exterior of the Pantheon is equally understandable since it faired more poorly over the centuries than the interior due to exposure to the natural elements, but also to the encroachment of neighbors and squatters, as well as spoliation by vandals and conquerors. The popes devoted their attention to the building soon after their return from exile in Avignon, during a phase of political consolidation in early Quattrocento Rome. The *Liber Pontificalis* attributed the new lead sheathing of the dome, which had long been stripped of its gilt bronze tiles, to the pontificate of Martin V (1417–1431).[74] During the reign of the successor pope Eugenius IV (1431–1447), Flavio Biondo in his *Roma instaurata* reports on an overhaul of this new lead roof that was apparently already necessary.[75] Supplementing these written references is documentary proof of another fifteenth-century restoration of the lead tiling under the direction of the humanist pope Nicholas V (1447–1455). From his reign there still survive the relevant payment receipts and even some lead tiles, prominently stamped with the crossed keys, papal tiara, and name of the pope, as well as the date 1451 (Fig. 9.14).[76] Documents also reveal repeated attempts to free the portico of unsightly and unauthorized stalls and other buildings concurrent with these restorations.[77]

9.14. Lead roof tile from the former cover of the cupola of the Pantheon. (Musei Vaticani, inv. 56231 and 56232. Scala/Art Resource, NY)

Like the original form of the tabernacles inside the Rotunda, the bronze roof trusses of the porch, removed and melted down under the Barberini Pope Urban VIII in 1625 and replaced by wooden ones,[78] are known only from Renaissance depictions. In addition to the woodcuts in Sebastiano Serlio's Third Book,[79] originally issued in 1540, we have two even more precise illustrations of the lost roof trusses in their original state. A hitherto unidentified Portuguese artist, active around 1568–1570,[80] and another anonymous draftsman, conventionally known as Hand F in the so-called Goldschmidt Scrapbook with French drawings of the later sixteenth century,[81] provide two impressively comprehensive records of the Pantheon, studied in minute detail. The drawings include several surveys showing the rare antique construction with all its peculiarities (Fig. 9.15).[82] All that remains of it is a bronze rivet formerly in the possession of the seventeenth-century antiquarian, collector, and biographer Giovan Pietro Bellori.[83]



9.15. Timbering in the portico of the Pantheon; anonymous French draftsman, late sixteenth century. (New York, Metropolitan Museum of Art, Goldschmidt Scrapbook, fols. 84 v–85 r. Image copyright © The Metropolitan Museum of Art. Image source: Art Resource, NY)

On the Interest in the History of the Pantheon during the Renaissance

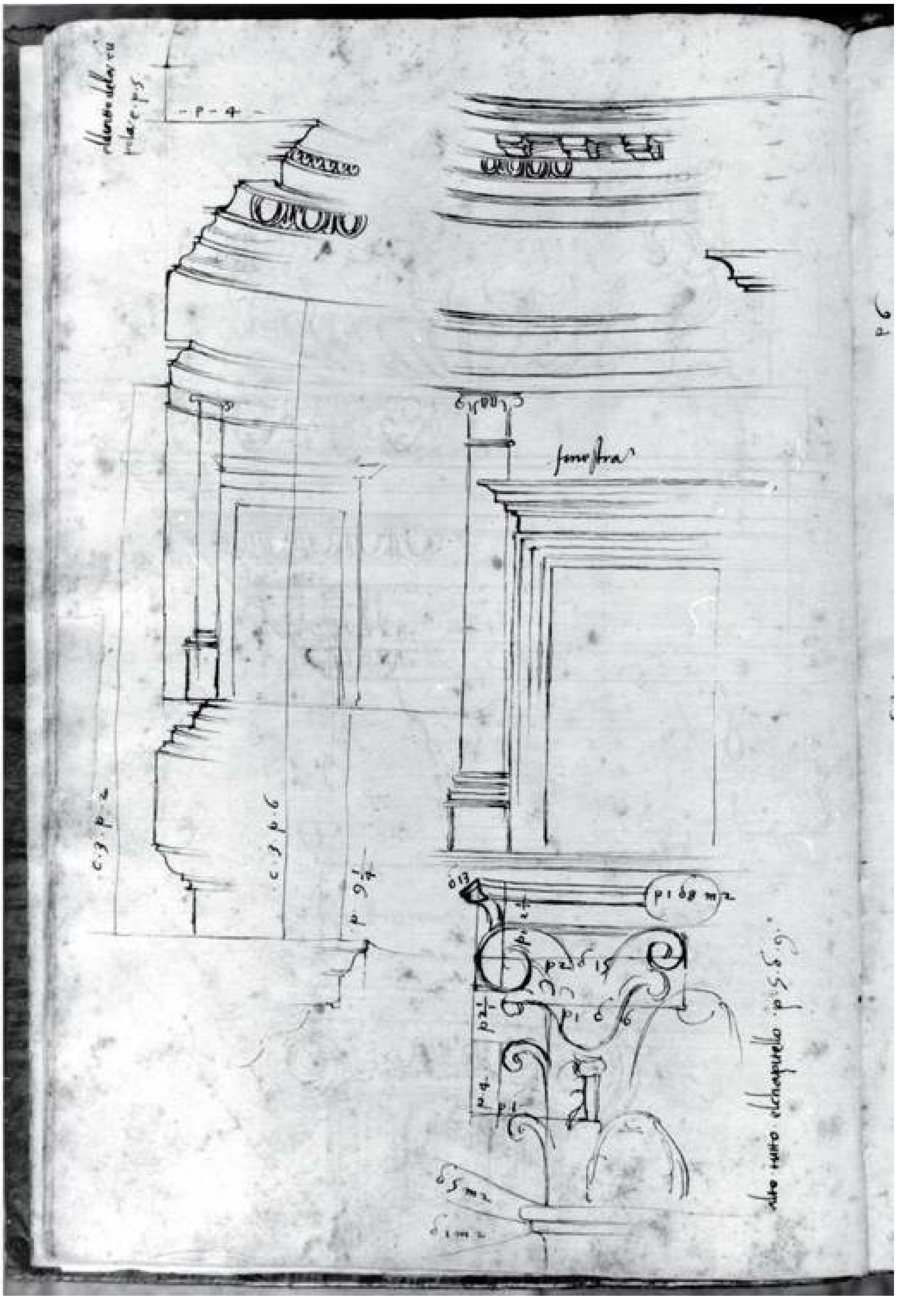
In some sense, the frequency with which the interior of the Pantheon was remodeled and refurnished as a church could be construed as antithetical to the idealized descriptions and representations that Renaissance artists have left in their vedute, surveys, and drawings. Indeed, some of the same architects, sculptors, and painters who recorded or "reconstructed" the ancient building and the piazza in front of it also participated in or contributed to their remodeling during this period. Yet it becomes evident that reflections on the pagan building were combined with the consciousness of the Christian alterations made to it over time and that both came to bear on attempts to understand the Pantheon. Thus, an astonishingly differentiated knowledge of the building was obviously available in which both traditions – pagan and Christian – were analyzed.

On the basis of legends enshrined in the *mirabilia* tradition, around 1450–1453 the English pilgrim John Capgrave maintained that Marcus Vipsanius Agrippa dedicated the building as a votive monument to the goddess Cybele, the legendary mother of the gods in the Greco-Roman pantheon. After Cybele had appeared in a dream to Agrippa, the general and son-in-law of Augustus vowed that in the event of his conquest and victory over the Persians, he would build this temple. Capgrave was understandably impressed by the domed building and repeated the story that it had been vaulted without scaffolding over a mound of earth in which gold coins had been buried. The Roman population, having been promised that they could keep any coins they found in it, then eagerly removed the earth from the building after the dome had been completed.[84] The Augustan tradition of the Pantheon, as transmitted through the Middle Ages, could easily be verified in the inscription commemorating Agrippa on the entablature above the portico. But it is especially remarkable that Capgrave was at least vaguely informed about the history of the building, or the one that had preceded it, for he also reports a dating of the Rotunda to the principate of the emperor Domitian, leaving the reader to determine the correct chronology.[85] Capgrave ends his account by introducing the new dedication of the Pantheon as a church for all martyrs and saints whose feast day (All Saints Day) had been shifted from its original date of May 13 or 15 to November 1 because, he said, it was more appropriately celebrated with the blessing of the harvests in the autumn.[86]

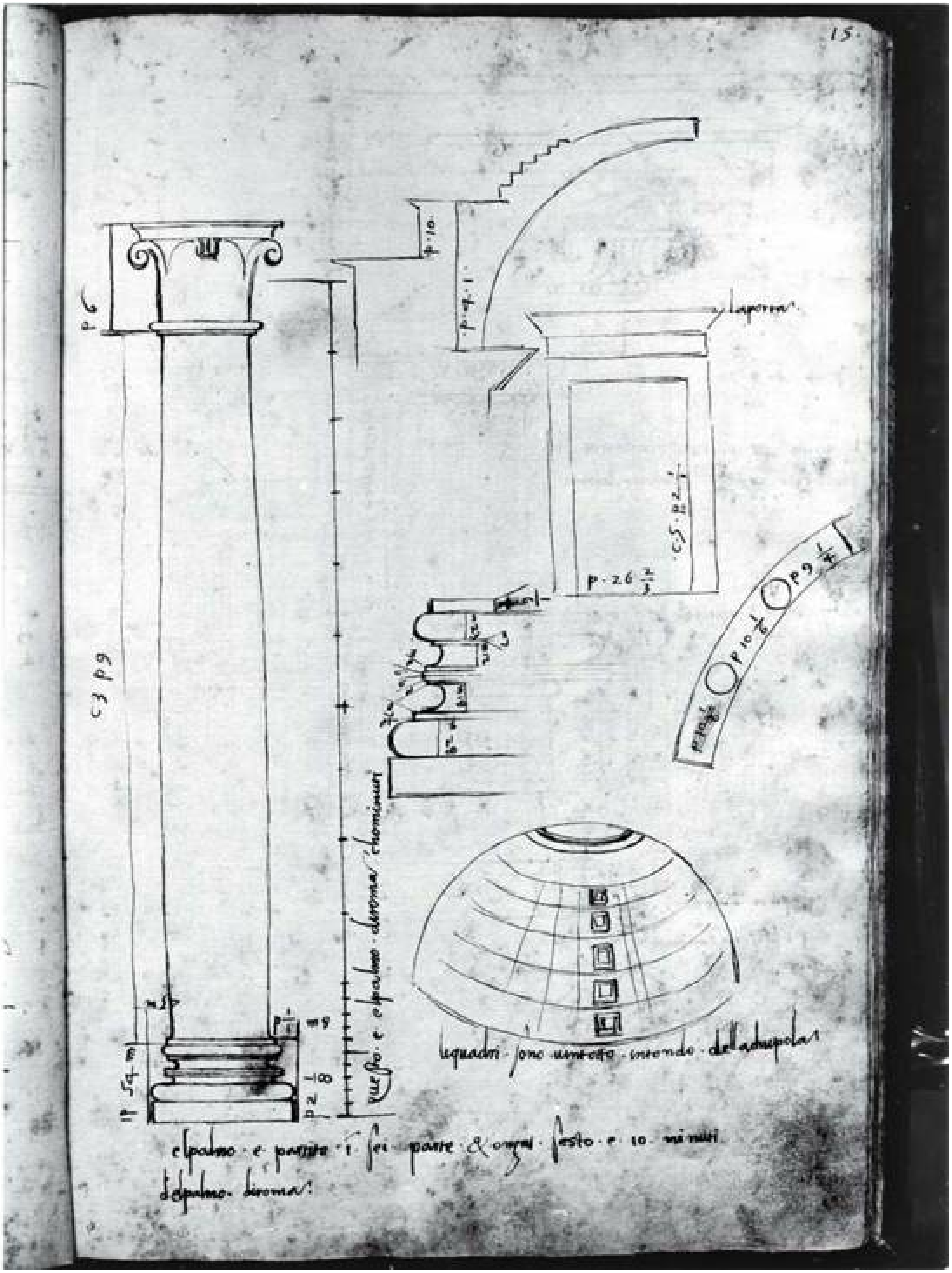
Such legends,[87] drawn from the local tradition, testify to the continuous fascination of the Pantheon, even for the inhabitants who lived around it. That was natural enough, for it was situated in the Campo Marzio, the main medieval residential quarter in Rome, which had shriveled in size following the decline and fall of the empire, the cutting of the aqueducts, and the abandonment of the hills of the city.[88] Following their return from Avignon, the Popes and their city planners were aware of this urban situation and privileged it in their remodeling of the piazza and their embellishment of it with antiquities and statues, which we have already mentioned. Thus in 1444, Eugenius IV ordered the rearrangement of the two basalt lions, the large porphyry tub, and the round porphyry basin that had been sitting on the piazza in front of the Pantheon since the Middle Ages. Almost a century later, those ancient Roman pieces were again relocated as part of a new scheme for the piazza under Leo X.[89] The antiquities led into the portico in front of the Rotunda; in this sense, both popes sought visibly to engage the Pantheon in a dialogue with the urban space in front of it and to present the ancient building in its public role.[90]

The various initiatives to restore and renovate the Pantheon since the Renaissance are thus expression of the evaluation and appreciation of its architectural mastery. The building's new users could hardly resist that appeal, which may also have attracted them to the building in the first instance. But at the same time, it also inspired them to embark on their own remodeling of it. Raphael strikingly manifests this duality: He reconstructed the ancient state of the temple interior during his short visit to Rome in 1506[91] and later studied the Pantheon in greater detail, as shown by his one surviving autograph sheet now in London[92] and by more copies in the Fossombrone book of drawings from his other now-lost surveys (Fig. 9.16 a and b).[93] Yet after his archaeological studies and his distinctly scientific approach, Raphael commissioned the altar with the statue of the *Madonna del Sasso* to be erected over his tomb in his last will and testament in 1520. The form of the sculpture pays tribute to the pagan past, while its iconography contributes to the temple's Christian use.

(a)



(b)



9.16 a and b. Pantheon studies; drawings by the Anonymous Foro Semproniensis(?). (Fossombrone, Italy, Biblioteca Civica Passionei, inv. Disegni vol. 3, fol. 14v–15r)

The decoration of the Pantheon cannot, therefore, be separated from the historical and theoretical analyses of the building, and each observer will differentiate among the elements according to his or her own particular artistic or intellectual ambition. The same can also be said of architectural adaptations that imply or even presuppose a theoretical reflection on the Pantheon. Such adaptations were rarely a recreation of the whole building, as was perhaps most impressively achieved in Andrea Palladio's Villa Rotonda outside of Vicenza. More often we see manifestations of the desire to replicate details that characterize the architectural system of antiquity. Here, for example, we may cite the corner solution for the Corinthian order, with its angled pilasters in the oblong alcoves, which

Filippo Brunelleschi imitated in the Old Sacristy in S. Lorenzo, Florence (Figs. 9.17, 9.18). Bramante did the same in the upper Cortile del Belvedere.[94] He again adopted the classical Corinthian order for the new St. Peter's in Rome.[95] In the impressive working drawing of the capitals made for the stonemasons of the new basilica[96] we can still feel today, as 500 years ago, the power of inspiration transmitted by the commanding capitals of the Pantheon.

9.17. Capital from rectangular alcove of the Pantheon. (Marvin Trachtenberg, "Why the Pazzi Chapel Is Not by Brunelleschi," in *Casabella* 60, 1996, pp. 58–77, Fig. 22; used with permission of the author)

9.18. Capital by Brunelleschi from the Pazzi Chapel, Florence, fifteenth century. (Ministero per i Beni e le Attività Culturali, Instituto Centrale per il Catalogo e la Documentazione)

The same act of transference can directly be grasped in the case of the entablature for S. Biagio alla Pagnotta, Rome. A drawing by Antonio da Sangallo the Younger documents explicitly the juxtaposition of Menicantonio's study in the Pantheon, executed for Bramante, and Bramante's own design for the church.[97] In Raphael's Chigi Chapel in S. Maria del Popolo, the appeal exerted by the Pantheon goes beyond the particular forms, as it is manifest even in the materials he employed: Raphael not only used marble incrustation on the walls of the chapel but also matched the distinctive threshold made of African marble in the Pantheon[98] with a massive step hewn from the same stone for the entrance to his domed, centrally planned, chapel.

Even more than these drawings and similar artistic responses to the Pantheon, an episode recounted by Vasari in his *vita* of Andrea Sansovino gives a vivid insight into the different aspects discussed about the Pantheon in their day. According to Vasari, criticism soon began to circulate

about the coffers of the barrel vault in the sacristy vestibule of S. Spirito in Florence with the coffers designed by Cronaca in 1492 while the vestibule had been built based on the plans of Giuliano da Sangallo since 1489; the criticism was aimed at the fact that the arrangement of the coffers was not aligned with the columns.[99] Andrea Sansovino, who had sculpted the column capitals, had apparently justified the solution by explicitly citing Cronaca's ancient prototype and referred to precedents in the Pantheon. Cronaca, Vasari reported, had adopted the method of the coffering in the Rotunda interior, "where the ribs that radiate from the oculus high in the center, from which that temple gets its light, serve to enclose the square, sunk panels containing the rosettes, which diminish little by little, as likewise do the ribs; and for that reason they do not fall in a straight line with the columns."[100]

In this anecdote not only did Vasari demonstrate the sort of criticism to which architects were exposed and needed to defend against, but he also used the episode to explain the role played by the archaeological/art-historical and theoretical discussions of contemporaries. On the one hand, Vasari vividly described the intensity of the controversy by quoting the justification of one of the protagonists, Andrea Sansovino. On the other hand, he distanced himself from Andrea's explanation by reporting Michelangelo's hypothesis about the building history of the Pantheon that rebuts Sansovino's interpretation. For, according to Vasari and other sources, Michelangelo believed that the Pantheon had been built by three architects, the first of whom carried it to the large cornice, the second continued from the cornice upward, and the third built the portico. This explanation accounted for the lack of alignment between the coffering and the vertical members below it. Thus, Vasari:

> Nevertheless many craftsmen, and Michelangelo in particular, have been of the opinion that the Rotonda was built by three architects, of whom the first carried it as far as the cornice that is above the columns, and the second from the cornice upwards, the part, namely, that contains those windows of more graceful workmanship, for in truth this second part is very different in manner from the part below, since the vaulting was carried out without any relation between the coffering and the straight lines of what is below. The third is believed to have made the portico, which was a very rare work. And for these reasons the masters who practice this art at the present should not fall into such an error and then make excuses, as did Andrea.[101]

In sum, Michelangelo had made the same formal observation as Sansovino, but adopted an equally skeptical attitude with respect to the architecture of antiquity as the critics did to his contemporary architecture, explaining the peculiarities of the Pantheon in historical – that is, diachronic – terms. As Capgrave a half century earlier had been aware of the question of the preceding building, Michelangelo posed the possibility of changes in plan during the course of the Pantheon's construction in antiquity. Such discussions are examples of the varying attitudes toward these questions. The theories and reflections about the Pantheon that still occupy modern research on the building were thus already being eagerly debated in the fifteenth and sixteenth centuries.[102] With methodologically quite similar approaches, observations were made throughout the centuries and inferences drawn from them, which led to the hypothesis – as controversial then as now – that more than one architect had designed the Pantheon.[103]

In surveys of the Pantheon, in the ground plan, elevation, and section, as well as in drawings of numerous details, architects and artists of the Renaissance often acquired precise knowledge of the building as a necessary premise to evaluate it. In order to achieve so comprehensive a grasp of

details and the whole, as authoritatively displayed by Baldassare Peruzzi in his rendering in Ferrara (see Fig. 10.5) of a longitudinal section through the entire temple and portico, innumerable individual studies were required. He needed systematically to penetrate the architecture and to understand the principles that had inspired it.[104] This becomes clear in the pilaster that he drew behind the door, where none actually exists and apparently as a correction, presumably because, according to his understanding of ancient architecture, he thought it was missing.[105] Sometimes in the detailed surveys of the Renaissance, parts of the building that are no longer extant were recorded, and it is from such documents that we can reconstruct the marble incrustation of the vestibule.[106]

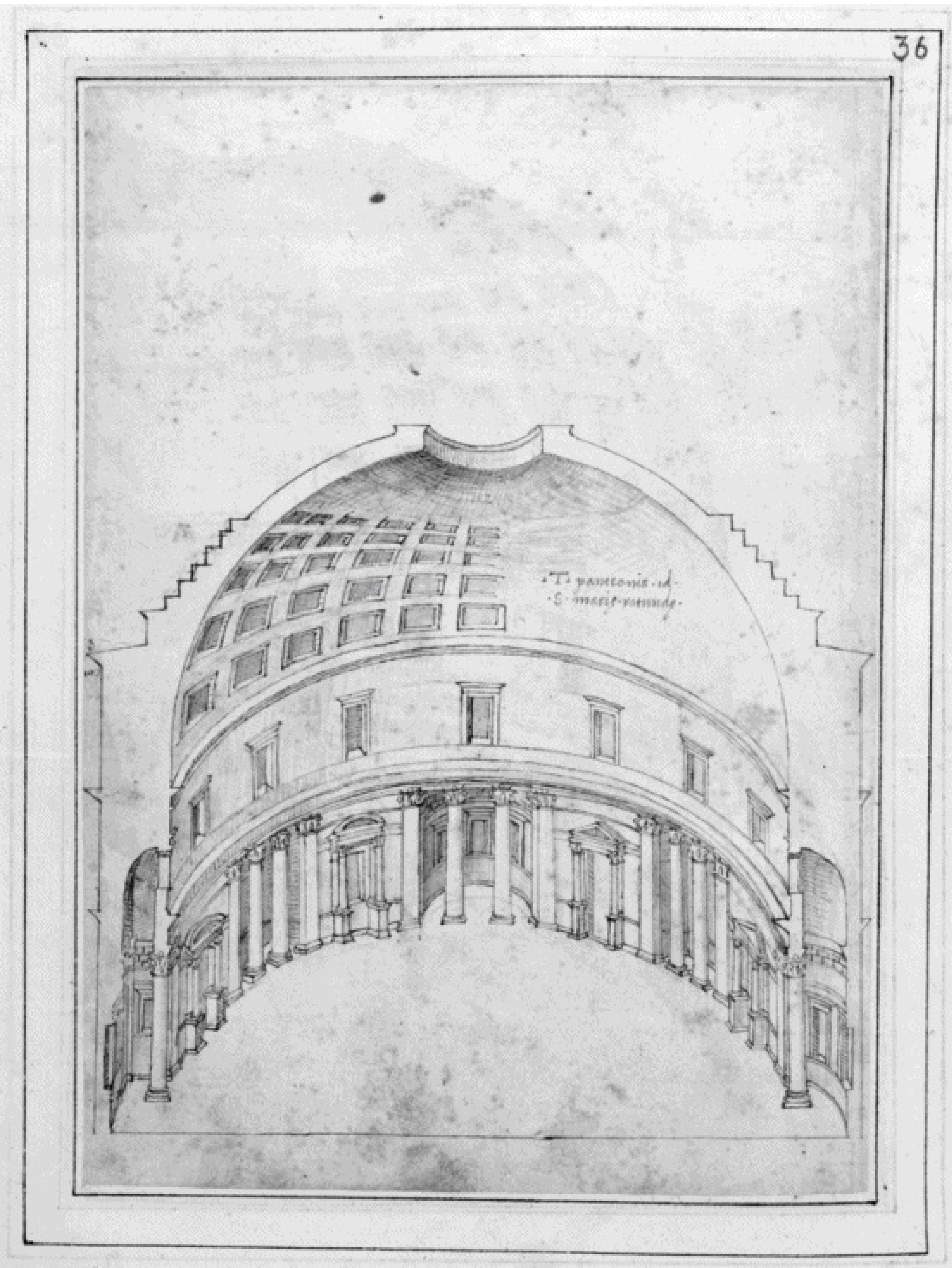
Ideal Versions of the Pantheon

Apart from theoretical approaches, historical analyses, and imitations of the building both as a whole and in detail, numerous artists and architects in the Renaissance found the Pantheon a challenge to their artistic and architectural invention. They could enter into creative dialogue with the building as a total organism, at least in their drawings, or might seek their own solutions to the task of building. Without anyone having commissioned them to do so, they created variations of the Pantheon theme. In the *Addendum* to his Turin Codex, for example, Francesco di Giorgio Martini altered the proportions and aligned the lower and upper order of the Pantheon with the ribs between the coffers of the dome (see Fig. 10.4).[107] The steep, almost gothic, shapes in this drawing give rise to a distinctly Quattrocento variant of the Pantheon. Francesco di Giorgio established the overall architectural system by using a classical syntax but, in contrast to the ancient building, relocated all vertical elements that connect the stories in axial alignment. At the same time, he limited the polychrome marble incrustation to an intermediate zone between the two stories and dealt in his drawing only with a half section of the rear third of the rotunda. In these ways, he indirectly showed how conscious he was of the enormous complexity of the ancient solution.

A quite different claim was made by Antonio da Sangallo the Younger, whose architectural understanding was orientated toward or based on a dogmatic canon. From countless in situ drawings he was familiar with the Pantheon down to precise details. No one perhaps has ever measured and drawn it so pedantically as he did. He took the ancient architect to task even for infinitesimal departures from the architectural theories of Vitruvius, down to the smallest unit of the minute, that is, down to less than 0.5 millemeters.[108] Apart from his surveys of the building, drawn either in situ or worked up in his studio, there exist five sheets with proposals for improvements, culminating in a megalomaniacal but pettifogging scheme that made him raise the Pantheon on a podium of no fewer than 20 steps fronted by a portico packed with a forest of 36 columns. His elevation becomes entangled in a jumble of axes, alignments, and projecting entablatures. It is forced into the modules and ideological preconceptions of a procrustean set of rules. This group of five drawings is rightly interpreted as Antonio's criticism of the ancient Pantheon.[109] Of the inspired structure of the original building, developed from the circle and able to resolve any conflict of the architectural organism by the dynamic inherent in the curve, nothing is left. Sangallo's central-plan building is a caricature of the Pantheon.[110]

Nor could Bernardo della Volpaia, who worked together with Antonio da Sangallo, resist the fascination of the Pantheon. In his so-called Codex Coner, among the most subtle surveys of ancient architecture, we find a section through the building in which the author tried all syntactic possibilities

of the ancient architectural system in a single drawing (Fig. 9.19).[111] The wall elevation runs evenly around the interior. The roughly rectangular and semicircular alcoves alternate in the opposing sequence on either side of the middle axis. Thus, Volpaia can show a section of both shapes in the foreground. In the ancient building, the aedicules articulate the rhythm of the wall, since those with segmental pediments flank the semicircular alcoves, while the triangular pedimented aedicules determine the ends of the sides in the semicircles of the complex organization of the Pantheon's ground plan and elevation. Volpaia only alludes to the alternating aedicules by showing just one type on either side of the middle axis. Thanks to his skill in architectural representation, he manages to convey a systematic scheme of theme and variation that embraces consistency in rhythm.



9.19. Longitudinal section of the Pantheon; drawing by Bernardo della Volpaia. (London, Sir John Soane's Museum, Codex Coner, fol. 32 v)

In his complex representation, Volpaia combined an orthogonal section with a perspectival view from a raised viewpoint outside the building and tried to convey on one sheet all of the phenomena that occur in the Pantheon. He placed an alcove with a semicircular plan on the middle axis and to the right of it, intentionally deviating from the actual building, and added a rectangular alcove that is followed in turn by a portion of a semicircular alcove. To the left of the central axis, Volpaia reversed the sequence by depicting a semicircular alcove followed by a truncated portion of a rectangular alcove. These deviations from the symmetrical sequences of the actual building help to demonstrate the rhythmic complexity of the ensemble. At the same time, he maintained the counterpoint that underlies the elevation system of the Pantheon interior, carrying it horizontally rather than vertically through the building. Thus, he introduced a symmetrical juxtaposition of the two types of the aedicules, two with segmental gables to the left, two with triangular gables to the right. Omitting the entrance niche and the main apse of the ancient temple, he generated the impression that he overcame a discordant note that many contemporaries had recognized and criticized.[112] The creation of his drawing conjures up an ideal Pantheon, a sanctuary in which no human could disturb the deity – or the architecture – because no one could gain access to a space that lacks a door.

As an embodiment of the ideal of ancient architecture, the Pantheon has also served a provocative function. In Philipp Galles's print *King Josiah Destroys the Temple of Ashtoreth, Chemosh and Milchon*, which was based on a design by Maarten van Heemskerck (Fig. 9.20),[113] the ancient Roman central-plan building has been dismantled as a pagan sanctuary and lies in ruins. Heemskerck was very familiar with the Roman monuments since he had extensively studied and documented them in his sketchbooks while resident in Rome from 1532 to 1536. Here, he seems to have given iconographic form to an indictment by John Calvin and propagated its consequences. Calvin had reproached the early Church for idolatry since in his view, it had taken over the pagan monuments, imitated the practices of the ancients, and, instead of christianizing them, had succumbed to the ancient pagan religions.[114]

9.20. *King Josiah Destroys the Temples of Ashtoreth, Chemosh, and Milcom*; Philipp Galles after Maarten van Heemskerck. (Kupferstich, Amsterdam)

The majesty of the Pantheon and its legendary imagery is perhaps most strikingly expressed in an anecdote about Emperor Charles V that is still current in Rome to this day. In 1535 after his campaign in Tunis, the emperor visited Rome and celebrated a triumph *all'antica*, eight years after he had conquered and plundered the city in his terrible Sack of Rome. With his army, he processed like a Roman emperor along the Via Sacra to the Capitol. His most ardent wish at that time was to climb the dome of the Pantheon. In one version of the story, the son of the monument's keeper was chosen to accompany the emperor alone during his vertiginous ascent. The feeling, or rather the dread, of standing on the edge of the open oculus, unprotected by any balustrade and looking down into the rotunda, where the dome plummets under one's feet and one has no visible hold, is more than vertiginous; it is indescribable, unimaginable before one actually stands there. For an emperor, however, it was not possible to approach the wide-open oculus crawling on all fours and still less to turn around before arriving at the opening, particularly when accompanied by an adolescent attendant who had grown up with this cupola and for whom it aroused no fear. Indeed, the majesty of Charles V was meant to be revealed in the solemnity with which the visit took place. Naturally, the keeper later asked his son what it had been like standing there with the emperor on the dome of the Pantheon. According to the story, the son answered that he had suddenly been reminded of the dreadful Sack of Rome and the murderous occupation of the city by the emperor's troops, for which this man had been responsible, and that at that moment he would have dearly liked to cast him down from the oculus. Knowing that such a remark alone could have spelled certain death equal to the real deed itself, the father is said to have replied to his hotheaded offspring: "My son, one doesn't say such a thing; one does it!"

Miguel de Cervantes (1547–1616) retold the story in a slightly adapted form in his *Don Quixote*. In this version, the role of the youth was assumed by a Roman knight who accompanied Charles V to the Rotunda,

> which in antiquity was called the temple of all the gods and which now bears the better name of Church of All Saints and which is the best-preserved building of all those that were erected in pagan Rome, the one that most fully evinces the grandeur and magnificence of its founders. It takes the form of half an enormous orange, and it is brilliantly lit, even though the only light comes in through a window or rather a round lantern at the top, from which the Emperor surveyed the building. The Roman knight, standing at his side on the edge of the oculus, detailed all the subtlety and skill of that splendid construction and that memorable architecture.

On descending from the dome he then confessed to the emperor the feelings not of revenge but of thirst for fame aroused by the experience: "A thousand times, Most Sacred Majesty, I felt the urge to clasp you in my arms and hurl myself down with you from the lantern, to win eternal fame for myself."

The Man of La Mancha tells the story to Sancho Panza as a parallel to the destruction of the Temple of Diana in Ephesus, one of the Seven Wonders of the World, by the sinner Herostratus: "he razed it to the ground, so that his name would live in future ages."[115] No artist, poet, or humanist of

the Renaissance otherwise drew the parallel with the Seven Wonders of the World, although all, even John Calvin, regarded the Pantheon with the same deep veneration as those monuments. Only Michelangelo offered higher praise or perhaps it was only a way of exorcising the pagan temple: he is said to have described the Pantheon or, rather, the lower order of its interior as *disegno non umano ma angelico*.[116]

This text was written more than ten years ago. The original, fully illustrated German version has meanwhile been published in *PEGASUS – Berliner Beiträge zum Nachleben der Antike* 10, 2008, pp. 37–84.

1 Ernst R. Fiechter, "Der ionische Tempel am Ponte Rotto in Rom (S. Maria Egiziaca)," *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung* 21, 1906, pp. 220–279; Arnold Nesselrath, *Das Fossombroner Skizzenbuch*, London 1993, pp. 115–120; Jean-Pierre Adam, *La construction romaine. Matériaux et techniques*, Paris 1984 (trans. as *Roman Building: Materials and Techniques*, Bloomington 1994); *Census* ID 151132.

2 Christiane Denker Nesselrath, *Die Säulenordnungen bei Bramante*, Worms 1990, pp. 47 and 127; Christiane Denker Nesselrath, "Bramante e l'ordine corinzio," *L'emploi des ordres dans l'architecture de la Renaissance*, ed. Jean Guillaume, Paris 1992, pp. 83–96; pp. 86–89.

3 For Raphael, there was an essential difference between the architecture of antiquity and that of the Renaissance in their respective use of materials (Vincenzo Golzio, *Raffaello nei documenti, nelle testimonianze di contemporanei e nella letteratura del suo secolo*, Vatican City 1936, p. 85; John Shearman, *Raphael in Early Modern Sources – 1483–1602*, New Haven 2003, vol. 1, p. 520).

4 Ian Campbell, "The New St Peter's: Basilica or Temple?" *Oxford Art Journal* 4, 1981, pp. 3–8; p. 5; F. Lucchini, *The Pantheon,* Rome 1996, p. 114.

5 Cf. as a parallel to this the way Maarten van Heemskerck programmatically exploits the Colosseum in his self-portrait (Matthias Winner, "'Vedute' in Flemish Landscape Drawings of the Late 16th Century," *Netherlandish Mannerism*, ed. Görel Cavalli-Björkman, Stockholm 1985, p. 91).

6 On the medieval legends of the expulsion of the demons and the origin of the oculus, cf. Tilmann Buddensieg, "Raffaels Grab," in *Munuscula discipulorum. Kunsthistorische Studien Hans Kauffmann zum 70. Geburtstag 1966*, ed. Tillmann Buddensieg and Matthias Winner, Berlin 1968, pp. 56–58, Fig. 40.

7 Giovanni Eroli, *Raccolta generale delle iscrizioni pagane e cristiane esistite ed esistenti nel Pantheon di Roma*, Narni 1895, pp. 343–438; Buddensieg 1968.

8 Eroli 1895, p. 438.

9 Eroli 1895, pp. 439–440.

10 Eroli 1895, p. 440; Zygmunt Wazbinski, "Annibale Carracci e l'Accademia di San Luca: a proposito di un monumento eretto in Pantheon nel 1674," in *Les Carrache et les décors profanes* (Actes du Colloque organisé par l'École Française de Rome 1986, Collection de l'École Française de Rome 106), Rome 1988, p. 562.

11 Marisanta Di Prampero de Carvalho, *Perché Giovanni fu sepolto al Pantheon*, Udine 2003.

12 Wazbinski 1988.

13 Wazbinski 1988, pp. 562–563.

14 Eroli 1895, p. 232; Roberto Vighi, *The Pantheon*, Rome 1964, p. 48.

15 Wazbinski 1988, p. 563; Di Prampero de Carvalho 2003, p. 17.

16 Florence, Uffizi, inv. 164 A; *Census* ID 44648. John Shearman, "Raphael, Rome, and the Codex Escurialensis," *Master Drawings* 15, 1977, pp. 107–146, esp. pp. 109–117, Plates 1–3; Arnold Nesselrath, "Raphael's Archeological Method," *Raffaello a Roma*, Rome 1986, pp. 358–361, Figs. 5–9.

17 Antonio Muñoz, "La decorazione medioevale del Pantheon," *Nuovo bulletino di archeologia cristiana* 18, 1912, pp. 25–35; pp. 32–34.

18 Richard Krautheimer, *Rome – Profile of a City, 312–1308*, Princeton 1980, p. 56.

19 Flavio Biondo, *Roma Ristaurata et Italia Illustrata*, ed. Lucio Fauno, Venice 1558, fol. 65; Ferdinando Castagnoli, Carlo Cecchelli, Gustavo Giovannoni, and Mario Zocca, *Topografia e urbanistica di Roma*, Bologna 1958, p. 350, Plate LXXXV.2; Tod A. Marder, "Alexander VII, Bernini and the Urban Setting of the Pantheon in the Seventeenth Century," *Journal of the Society of*

Architectural Historians 50, 1991, pp. 273–292; pp. 273–276.

20 El Escorial, Codex Escurialensis, fol. 43 v; *Census* ID 67021. Cf. Hermann Egger with contributions by Christian Hülsen und Adolf Michaelis, *Codex Escurialensis: Ein Skizzenbuch aus der Werkstatt Domenico Ghirlandajos*, Vienna 1905–1906, vol. 1, p. 116; Thomas Ashby, *Topographical Study in Rome in 1581*, London 1916, p. 131.

21 Paris, Louvre inv. 11029 r; *Census* ID 64421. Cf. Ashby 1916, p. 131; Castagnoli et al. 1958, p. 350, Plate LXXXV.2.

22 *Census* ID 63876; Roberto Valentini and Giuseppe Zucchetti, *Codice topografico della città di Roma*, vol. 3, Rome 1946, p. 159; Cristina Nardella, *Il fascino di Roma nel medioevo*, Rome 1997, pp. 80, 126, and 162–163.

23 Rodolfo Lanciani, *Storia degli scavi di Roma e notizie intorno le collezioni romane di antichità*, Rome 1902–1912, pp. 15 and 51–52. Since it is deduced from this mention that they were found close to the Pantheon, this argument holds no longer. A provenance from the ancient Roman Iseum Campense, however, does not need to be excluded.

24 The period of Leo X's reinstallation of the antiquities in front of the Pantheon can be deduced from the term of office of the *maestri delle strade* Bartolomeo della Valle and Raimondo Capodiferro. Cf. Emilio Re: "Maestri di strade," *Archivio della Società Romana di Storia Patria* 43, 1920, pp. 5–102. I wish to thank Stefan Bauer and Andreas Rehberg for this information.

25 Eroli 1895, pp. 451–452.

26 Florence, Uffizi, inv. 160 S r; *Census* ID 43556. The identification of the draftsman with Baldassare Peruzzi himself, as proposed by Christoph Luitpold Frommel ("Peruzzis römische Anfänge," *Römisches Jahrbuch der Bibliotheca Hertziana* 27/28, 1991–1992, pp. 137–182), is untenable for various reasons. A comparison between the handwriting on the sheet and that of genuine Peruzzi drawings is unconvincing; Frommel (1991–1992, p. 174, n. 96) totally ignores in his argument the dating of the sheet by the same hand in Bayonne, Musée Bonnat, inv. 1342 r, to the third decade of the sixteenth century (Arnold Nesselrath, "Due candelabri antichi restaurati al tempo di Raffello," in *Raffaello in Vaticano*, ed. Fabrizio Mancinelli, Anna Maria De Strobel, Giovanni Morello, and Arnold Nesselrath, exh. cat., Milan 1984, pp. 98–99, fig. on 99, and Nesselrath 1993, pp. 152–153) and cuts off the crucial part of the sheet in his illustration (Fig. 21); the dating of the veduta of the Pantheon being discussed here, which must postdate the beginning of the pontificate of Leo X in 1513 since it incorporates the statues in their Leonine setting, contradicts an early dating, as proposed by Frommel, yet it is this early dating that is the presupposition for an attribution to Peruzzi.

(Cf. Arnold Nesselrath, "Il Pantheon," in *La Roma di Leon Battista Alberti. Umanisti, architetti e artisti alla scoperta dell'antico nella città del Quattrocento*, ed. Francesco Paolo Fiore in collaboration with Arnold Nesselrath, exh. cat., Milan 2005, p. 200, cat. II.2.5). Cf. Alfonso Bartoli *I monumenti antichi di Roma nei disegni degli Uffizi di Firenze*, 6 vols., Rome 1914–1922, vol. I, Tav. 13, Fig. 27; vol. 6, p. 9; Doris Gruben and Gottfried Gruben, "Die Türe des Pantheon," *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung* 104, 1997, pp. 3–74; p. 11, Fig. 6 (with the old attribution to Cronaca).

27 Berlin, SMPK, Kupferstichkabinett, Heemskerck-Album I, fol. 10 r (Christian Hülsen and Hermann Egger, *Die römischen Skizzenbücher von Marten van Heemskerck*, 7 vols., Berlin 1913, repr. 1916, vol. 1, p. 7; *Census* ID 43444) and Heemskerck-Album II, fol. 2 r (Hülsen and Egger 1913, repr. 1916, vol. 2, p. 3; *Census* ID 44703). The drawings of the Dutch artist so-called Anonymus B were made after 1538; cf. Ilja M. Veldman, "Heemskercks Romeinse tekeningen en 'Anonymus B,'" *Nederlands Kunsthistorisch Jaarboek* 38, 1987, pp. 369–382.

28 Carlo Montani, "Il Pantheon e i suoi recenti restauri," *Capitolium* 8, 1932, pp. 417–426; p. 426; Susanna Pasquali, *Il Pantheon: architettura e antiquaria nel Settecento a Roma*, Modena 1996, p. 162; Susanna Pasquali, *Roma sacra – guida alle chiese della città eterna,* vol. 8: *Santa Maria ad Martyres (Pantheon)*, Rome 1996, p. 45.

29 Shearman 1977, pp. 109–117.

30 Pasquali 1996b, p. 46.

31 Muñoz 1912, pp. 32–34, Fig. 5.

32 Eroli 1895, p. 250; Vighi 1964, p. 41, fig. on p. 43; Anna Cavallaro, *Antoniazzo Romano e gli Antoniazzeschi*, Udine 1992, p. 268, no. 146, Fig. 250; Pasquali 1996b, p. 46.

33 For reasons of conservation, the fresco has been detached from the wall but reinstalled in the same niche: Cavallaro 1992, pp. 268–269, no. 147, Fig. 251.

34 Vighi 1964, p. 41.

35 Muñoz 1912, p. 32, Fig. 4.

36 Shearman 1977, pp. 111–115. In his attempt to explain the unusual two-part approach of the

draftsman, John Shearman proposed that it is the work of two different artists. After cautious doubts had been expressed about this supposed differentiation of hands in the sheet (Nesselrath 1986a, p. 359), the current explanation makes the feature of the two-part elevation, first and rightly remarked by Shearman, less peculiar and tends to support even the attribution of both halves of the drawing to Raphael. It further underlines Shearman's identification of Raphael's drawing as the prototype on which all copies and indirect copies depend.

37 The sheet in the Uffizi, however, does not comprise in toto all of the studies that Raphael completed in the Pantheon in 1506. Cf. Nesselrath 1986a, pp. 360–361, and Arnold Nesselrath, "I libri di disegni di antichità – tentativo di una tipologia," *Memoria dell'antico nell'arte italiana*, vol. 3, ed. Salvatore Settis, Torino 1986, p. 110.

38 Christoph Luitpold Frommel, "Raffaello e la sua carriera architettonica," in *Raffaello Architetto*, ed. Christoph Luitpold Frommel, Manfredo Tarfuri, and Stefano Ray in collaboration with Howard Burns and Arnold Nesselrath, exh. cat., Milan 1984, pp. 13–46; p. 17. On the question of the originality of the architectural background of the *Madonna del Baldacchino*, left unfinished at Raphael's departure for Rome, cf. Marco Chiarini, Marco Ciatti, and Serena Padovani (*Raffaello a Pitti: La Madonna del Baldacchino – storia e restauro*, Florence 1991, pp. 17–18), who reexamined the position adopted by Peter Anselm Riedl ("Raffaels 'Madonna del Baldacchino,'" *Mitteilungen des Kunsthistorischen Institutes in Florenz* 8, 1957–1959, pp. 239–246). Cf. J. Meyer zur Capellen, *Raphael*, vol. 1, Landshut 2001, cat. 40, for an illustration.

39 Shearman 1977, pp. 128–130, Fig. 6; Frommel 1984, p. 17.

40 Paris, Louvre, inv. 19051 v. I would like to thank the late Wolfgang Lotz for the reference to this sheet. Cf. Nesselrath 2005, p. 191, fig. on p. 192. On Hermann Vischer, see Wolfgang Lotz, "Zu Hermann Vischers d. J. Aufnahmen italienischer Bauten," in *Miscellanea Bibliothecae Hertzianae* (Römische Forschungen der Bibliotheca Hertziana 16), Munich 1961, pp. 167–174; see Emmanuel Starcky, *Dessins de Dürer et de la Renaissance germanique*, Paris 1991, pp. 101–104, and Volker Plagemann, "Tod in Bologna – Hans Cranachs Reise 1537 – Zur Frühgeschichte der Künstlerreisen nach Italien," *Niederdeutsche Beiträge zur Kunstgeschichte* 41, 2002, pp. 37–155; pp. 110–113, especially Fig. 38.

41 Eroli 1895, p. 430; Sible de Blaauw, "Das Pantheon als christlicher Tempel," *Bild und Formensprache der spätantiken Kunst. Hugo Brandenburg zum 65 Geburtstag*, *Boreas* 17, Münster, 1994, pp. 13–26; p. 22.

42 Pasquali, 1996a, p. 139.

43 Eroli 1895, pp. 239 and 430; De Blaauw 1994b, p. 22.

44 Tod A. Marder, “Bernini and Alexander VII: Criticism and Praise of the Pantheon in the Seventeenth Century” *Art Bulletin* 71, no. 4, 1989, pp. 628–645; p. 629, Fig. 3; Angela Cipriani, “Lavori per l’isolamento e il restauro del Pantheon,” in *Bernini in Vaticano,* exh. cat., Rome 1981, pp. 192–197; Pasquali 1996a, p. 69, Fig. 34.

45 Biblioteca Apostolica Vaticana, Chigi P VII 9, fols. 108 r and 110 r. Marder 1989, p. 629; De Blaauw 1994b, pp. 20–22, Figs. 3–4. The flap showing the altar in elevation on folio 110 r is located at the lower left of the sheet but is not visible in the photograph available to us.

46 Milan, Civico Gabinetto dei Disegni, Collezione sardini Martinelli, inv. 5, fol. 99 r.

47 Milan, Civico Gabinetto dei Disegni, Collezione sardini Martinelli, inv. 5, fol. 76 r (fol. 77 shows a longitudinal section).

48 Eroli 1895, pp. 239 and 430.

49 De Blaauw 1994b, pp. 22–23. Eroli 1895, p. 266, mistakenly dates it to the period of Innocent VIII.

50 Lanciani 1902–1912, vol. 1, pp. 88.

51 Pasquali 1996a, pp. 32, 33, 36, and 41, Figs. 16–17.

52 Tod Marder, “Specchi’s High Altar for the Pantheon and the Statues by Cametti and Moderati,” *Burlington Magazine* 122, 1980, pp. 30–40.

53 Eroli 1895, p. 266.

54 Ulrich-Walter Gans, *Korinthisierende Kapitelle der römischen Kaiserzeit*, Vienna 1992, pp. 50–53, Fig. 36. In seeking nonstylistic dating criteria, the reported provenance of a capital very similar to the Pantheon capitals from the Baths of Caracalla, as transmitted by the Codex Destailleur B, fol. 103, in the Hermitage in St. Petersburg, is perhaps of interest.

55 El Escorial, Codex Escurialensis, fol. 44 r; *Census* ID 50729. Egger 1905–1906, vol. 1, pp. 117–

118; Nesselrath 2005, p. 191. On the chronological order and attribution of the codex, cf. Arnold Nesselrath, “Il Codice Escurialense,” *Domenico Ghirlandajo 1449–1494*, Atti del Convegno Internazionale, Florence 16–18 October 1994, Florence 1996, pp. 175–198.

56 London, Royal Institute of British Architects, inv. VIII/6. See Shearman 1977, p. 124; Nesselrath 1996, p. 185, Fig. 24.

57 Florence, Uffizi, inv. 4337 A v. Cf. Nesselrath 1996, p. 185.

58 Such a dating is consistent with the observations on the Codex Escurialensis, its relation to Filippino Lippi, and the proposed dating for the models; cf. Nesselrath 1996, pp. 192–196.

59 Giorgio Vasari, *Le vite de’più eccellenti pittori scultori ed architetti*, vol. 4, ed. G. Milanesi, Florence 1906, p. 382; Golzio 1936, pp. 116–118; Shearman 2003, vol. 1, pp. 569–571; Buddensieg 1968, pp. 45–46; Norbert Nobis, *Lorenzetto als Bildhauer,* Bonn 1979, pp. 115–117.

60 Lanciani 1902–1912, vol. 2, pp. 237–238.

61 Corrado Maltese, ed., *Francesco di Giorgio Martini: Trattati di architettura, ingegneria e arte militare*, Milan 1967, 2 vols.; vol. 1, pp. 280–281, tav. 147; *Census* ID 60550.

62 Biblioteca Apostolica Vaticana, Barb. lat. 4424, fol. 27 v; *Census* ID 60257. Cf. C. Hülsen, *Il libro di Giuliano da Sangallo: codice Vaticano Barberiniano Latino 4424*, Leipzig 1910 (repr. Vatican City 1984), p. 36.

63 Arnold Nesselrath, review of *Codices e Vaticanis selecti phototypice expressi*, vol. 39, Biblioteca Apostolica Vaticana, Vatican City 1984, reprint of Hülsen 1910, *Zeitschrift für Kunstgeschichte* 52, 1989, pp. 285–287.

64 London, Sir John Soane’s Museum, Codex Coner, fol. 52 r; *Census* ID 60104. Thomas Ashby, “Sixteenth-Century Drawings of Roman Buildings,” *Papers of the British School at Rome* 2, 1904, pp. 1–88; p. 37, no. 63. On the Codex Coner, cf. Arnold Nesselrath, “Codex Coner – 85 years on,” *Cassiano dal Pozzo’s Paper Museum* 2, 1992, pp. 145–167.

65 Michael Bury, “A Newly-Discovered Architectural Treatise of the Early Cinquecento: the Codex of Antonio da Faenza,” *Annali di architettura* 8, 1996, pp. 21–42; p. 32, Fig. 13. Timo Strauch is preparing a study on Antonio da Faenza and his treatises.

66 Lisbon, Museu Nacional de Arte Antiga, inv. 1713c v; *Census* ID 44650. Cf. Tilmann Buddensieg, "Bernardo della Volpaia und Giovanni Francesco da Sangallo – Der Autor des Codex Coner und seine Stellung im Sangallo-Kreis," *Römisches Jahrbuch für Kunstgeschichte* 15, 1975, pp. 89–108; pp. 93–94 and 103, Fig. 4.

67 Shearman 2003, vol. 1, pp. 748–749. On the *Madonna del Sasso*, cf. Nobis 1979, pp. 115–130.

68 *Census* ID 190999; M.-H. Pluchart, *Ville de Lille – Musée Wicar, Notice des Dessins, Cartons, Pastels, Miniatures et Grisailles exposés*, Lille 1889, p. 185, no. 875; Barbara Brejon de Lavergnée, *Catalogue des Dessins Italiens – Collections du Palais des Beaux-Arts de Lille*, Lille 1997, p. 314, no. 789 v (Frédérique Lemerle), fig. on p. 315. On Raffaello da Montelupo's book of drawings in Lille, cf. Arnold Nesselrath, "Il libro di Michelangelo a Lille," *Quaderni dell'Istituto di Storia dell'Architettura* N.S. 24, 1994, pp. 35–52. The drawings of Amico Aspertini in his London book of drawings, *Census* ID 61459 and 60954 (Phyllis Pray Bober, *Drawings after the Antique by Amico Aspertini*, London 1957, p. 89) are copied from the Codex Coner, fol. 52 r (Ashby 1904, p. 37, no. 63; *Census* ID 60104).

69 Cf., for example, the reerected Library of Celsus in Ephesus or the solutions in triumphal arches also from the Trajanic period, such as the one in Timgad.

70 The drawing is only known to me from a photo in the Witt Library in London that was cut out of a sale catalogue and that bears the name of O. Baer, Frankfurt. Curtis O. Baer emigrated from Frankfurt to the United States in 1940. The drawing is not mentioned in Eric Zafran, *Master Drawings from Titian to Picasso – The Curtis O. Baer Collection*, Atlanta 1985. I am indebted to the late Rupert Hodge for obtaining a reproduction of the photo for me many years ago.

71 Turin, Archivio di Stato, Cod.a.III.15.J.13, fols. 47 r–55 v. Lanciani 1902–1912, vol. 2, p. 23.

72 Kjeld de Fine Licht, *The Rotunda in Rome: A Study of Hadrian's Pantheon*, Copenhagen 1968, pp. 111–114 and 221, Figs. 121–122; Andrea Wandschneider, "Das Pantheon – Raumerfahrung und Sakralbestimmung," *Antike Welt* 20, no. 3, 1989, pp. 9–24; pp. 14–15, Figs. 6–7.

73 Muñoz 1912, pp. 25–27; Arnold Nesselrath, "Von Volpaia bis Volpi. Die farbige Marmorinkrustation der Vorhalle des Pantheon," *Pegasus* 4, 2003, pp. 19–36; pp. 20–22.

74 Eroli 1895, p. 265; P. Tomei, "Le vicende del rivestimento della cupola del Pantheon," *Bollettino d'arte* 32, 1938, pp. 31–39.

75 Biondo 1558, fol. 56; Eroli 1895, p. 265; Tomei 1938, pp. 31–32.

76 A series of these lead tiles are riveted onto the exterior perimeter of the drum around the Pantheon dome. Two are now in the Vatican Museums, inv. 56231 and 56232. Cf. Eroli 1895, pp. 265–266; Tomei 1938, p. 32, Fig. 2; Nesselrath 2005, p. 199, cat. II.2.2.

77 Eroli 1895, p. 265.

78 Gerald Heres, "Beiträge zur antiken Bronzekunst. Niet vom Gebälk des Pantheonsvorhalle," *Staatliche Museen zu Berlin, Forschungen und Berichte*, 22, 1982, p.197, tav. 30; *Der Ruhm des Pantheon*, ed. Wolf-Dieter Heilmeyer, Ellen Schraudolph, and Hildegard Wiewelhove, exh. cat., Berlin 1992, pp. 18–19.

79 Sebastiano Serlio, *Tutte l'opere d'architettura (I sette libri dell'architettura)*, Venice 1584, vol. 3, fol. 52 v.

80 Heres 1982, p. 196, fig. 2; Ian Campbell, A*ncient Roman Topography and Architecture,* London 2004, vol. 1, pp. 312–429; Ian Campbell, "Some Drawings from the 'Paper Museum' of Cassiano Dal Pozzo and the Berlin Codex Destailleur 'D'," *Pegasus* 6, 2004, pp. 23–45.

81 New York, Metropolitan Museum, fols. 84 v–85 r*; Census* ID 241205. Cf. Émilie D'Orgeix, "The Goldschmidt and Scholz Scrapbooks in The Metropolitan Museum of Art: A Study of Renaissance Architectural Drawings," *Metropolitan Museum Journal* 36, 2001, pp. 169–206; pp. 177–179; and now, Carolyn Y. Yerkes, "Drawings of the Pantheon in the Metropolitan Museum's Goldschmidt Scrapbook," *Metropolitan Museum Journal* 48, 2013, pp. 87–120.

82 D'Orgeix 2001, p. 178, Fig. 16; Campbell 2004a, vol. 1, pp. 412–416, cat. 140; Campbell 2004b, pp. 41–42, Figs. 11–12.

83 Heres 1982; Anne-Christin Batzilla, "Bronzeniet vom Pantheon," in *Barock im Vatikan 1572–1676* (exh. cat. Bonn and Berlin), Leipzig 2005, p. 142, no. 54. Louise Rice, "Bernini and the Pantheon Bronze," in *Sankt Peter in Rom 1506–2006. Beiträge der internationalen Tagung vom 22–25 Februar 2006 in Bonn, Beiträge der internationalen Tagung vom 22–25 Februar 2006 in Bonn*, ed. Georg Satzinger and Sebastian Schütze, Munich 2008a, pp. 337–352; Rice, "Urbano VIII e il dilemma del portico del Pantheon," *Bollettino d'arte* 143, 2008, pp. 93–110; Rice, "Pope Urban VIII and the Pantheon Portico," in Gerd Grasshoff, Michael Heinzelmann, and Marcus Wäfler, eds. *The Pantheon in Rome: Contributions to the Conference, Bern, November 9–12, 2006*, Bern 2009, pp. 155–156.

84 John Capgrave, *Ye Solace of Pilgrims*, trans. and ed. Daniela Giosuè, Rome 1995, pp. 70–72 and 195–196; *Census* ID 191221. The same expedient, of course, was canvassed by Florentines at the time the *cupolone* of S. Maria del Fiore was being projected in 1420: it would, they suggested, be a good thing to fill the area below the dome with earth and small coins, so that people would carry away the earth without expense once the dome had been raised (cf. Vasari, vita of Brunelleschi; Vasari repr. 1906, vol. 2, p. 345). I am indebted for the indication of this anecdote to Peter Spring.

85 Capgrave 1995, p. 72; Nesselrath 2005, p. 191.

86 Capgrave 1995, p. 197; Martin Wallraff, "Pantheon und Allerheiligen," *Jahrbuch für Antike und Christentum* 47, 2004, pp. 128–143.

87 For further descriptions, their historical analysis depending on the cultural level of the author, at times more anecdotal, at times more analytical, e.g., that of the Florentine merchant Giovanni Rucellai, or that of the mayor of Nuremberg Nikolaus Muffel, or that of the papal historian Flavio Biondo or the humanist Pomponio Leto, cf. Nesselrath 2005, pp. 191–192.

88 Krautheimer 1980, pp. 65–68.

89 Eroli 1895, pp. 266–267 and 451–452; Ashby 1916, p. 131.

90 Antonio Salamanca places the ancient porphyry sarcophagus in almost exaggerated form over the gable end of the porch (cf. Sylvie Deswarte-Rosa, "Les gravures de monuments antiques d'Antonio Salamanca, à l'origine du 'Speculum Romanae Magnificentiae,'" *Annali di architettura* 1, 1989, pp. 47–62; p. 54, Fig. 10) and thus takes its emblematic character into account. Antonio Lafreri presents his view of the Pantheon with the ancient sculptures in front (Ashby 1916, p. 131, pl. 42, Fig. 76; Christian Hülsen, "Das Speculum Romanae Magnificentiae des Antonio Lafreri," *Collectanea Variae Doctrinae, Leon Olschki Bibliopolae Florentino Sexagenario*, Munich 1921, pp. 121–170; p. 143; Heilmeyer, Schraudolph, and Wiewelhove 1992, pp. 31–32, cat. 2; Gruben and Gruben 1997, pp. 11–12, Fig. 6); they take the place of an explanatory caption and liken the reality of the piazza to the ancient building.

91 Shearman 1977, pp. 130–140.

92 London, RIBA, inv. XIII/1 r and v. Cf. Eckhart Knab, Erwin Mitsch, and Konrad Oberhuber, *Raphael – Die Zeichnungen*, Stuttgart 1983, p. 601, nos. 462–463; Arnold Nesselrath, "Raffaello: Profilo e alzato ortogonale, combinati tra loro, della trabeazione principale dell'interno del Pantheon," in Frommel, Tafuri, and Ray 1984, p. 420; Nesselrath 1993, pp. 16, 19, 30, 32–33, 37, 124–125, 131, 132, Figs. 128–129.

93 Nesselrath 1993, pp. 16, 19, 32–33, 37, 123–132, Figs. 25–27; *Census* ID 67335 and *Census* ID 67341.

94 Denker Nesselrath 1990, p. 93; *Census* ID 154486 and *Census* ID 51095.

95 Denker Nesselrath 1990, pp. 79–86; Denker Nesselrath 1992, pp. 86–89.

96 Florence, Uffizi, inv. 6770 A r und v. Denker Nesselrath 1990, pp. 79 and 81–86, Figs. 165–166; Denker Nesselrath 1992, p. 86, Figs. 14–15.

97 Florence, Uffizi, inv. 1191 A r. Denker Nesselrath 1990, pp. 96–97, Fig. 198; Denker Nesselrath 1992, pp. 88–89, Fig. 20; Arnold Nesselrath in *The Architectural Drawings of Antonio da Sangallo the Younger and His Circle*, ed. Christoph L. Frommel and Nicholas Adams, 2 vols., New York 1994, 2000; vol. 1, p. 216.

98 Gruben and Gruben 1997, pp. 31 and 54–55.

99 Riccardo Pacciani, "Firenze nella seconda metà del secolo," in *Storia dell'architettura italiana, Il Quattrocento*, 2 vols., ed. Francesco Paolo Fiore, Milan 1998; vol. 2, pp. 330–373.

100 Vasari repr. 1906, vol. 4, p. 511: ...dove le costole che si partono dal tondo del mezzo di sopra, cioè dove ha il lume quel tempio, fanno dall'una all'altra i quadri degli sfondati dei rosoni che a poco a poco diminuiscono; ed il medesimo fa la costola, perchè non casca in su la dirittura delle colonne.

101 Vasari repr. 1906, vol. 4, pp. 511–512; *Census* ID 43497: Nondimeno molti artefici, e particolarmente Michelagnolo Buonarroti, sono stati d'openione, che la Ritonda fusse fatta da tre architetti, e che il primo la conducesse al fine della cornice che è sopra le colonne; l'altro dalla cornice in su, dove sono quelle finestre d'opera più gentile; perchè in vero questa seconda parte è di maniera varia e diversa dalla parte di sotto, essendo state seguitate le volte senza ubbidire ai diritti con lo spartimento: il terzo si crede che facesse quel portico, che fu cosa rarissima. Per le quali cagioni i maestri che oggi fanno quest'arte, non cascherebbono in così fatto errore, per iscusarsi, come faceva Andrea. Cf. Tilmann Buddensieg, "Criticism and Praise of the Pantheon in the Middle Ages and the Renaissance," *Classical Influences on European Culture A.D. 500–1500: Proceedings of an International Conference Held at Kings College, Cambridge, April 1969*, ed. R. R. Bolgar, Cambridge 1971, pp. 259–267; p. 265; Arnold Nesselrath, "Raffaello e lo studio dell'antico nel Rinascimento," in Frommel, Tafuri, and Ray 1984, p. 407; Nesselrath 1993, p. 123.

102 Wolf-Dieter Heilmeyer, “Apollodorus von Damaskus – der Architekt des Pantheon,” *Jahrbuch des Deutschen Archäologischen Instituts, Römische Abteilung* 90, 1975, pp. 316–347; p. 319; Paul Godfrey and David Hemsoll, “The Pantheon: Temple or Rotunda?” in *Pagan Gods and Shrines of the Roman Empire*, ed. Henig et. al., Oxford 1986, pp. 195–209; Paul Davies, David Hemsoll, and Mark Wilson Jones, “The Pantheon: Triumph of Rome or Triumph of Compromise?,” *Art History* 10, 1987, pp. 133–153; Marder 1989, pp. 635–640; Gruben and Gruben 1997.

103 Heilmeyer 1975, pp. 330–333.

104 Ferrara, Biblioteca Comunale Ariostea, ms Classe I 217, fol. busta 4, no. 8 r; *Census* ID 62544. Cf. Howard Burns, “A Peruzzi Drawing in Ferrara,” *Mitteilungen des kunsthistorischen Institutes in Florenz* 12, 1965–1966, pp. 245–270.

105 Burns 1965–1966, p. 250, Fig. 3.

106 Nesselrath 2003.

107 Turin, Biblioteca Reale, Codex Saluzzianus 148, fol. 80 r; *Census* ID 60550. Maltese 1967, vol. 1, pp. 280–281, tav. 147; Buddensieg 1971, pp. 263–265, Fig. 3c; Marder 1989, p. 635, Fig. 11; Nesselrath 2005, p. 192, fig. on p. 190.

108 Florence, Uffizi, inv. 1060 A r; *Census* ID 46413. Cf. Nesselrath in Frommel-Adams 2000, pp 200–201.

109 Buddensieg 1971, pp. 265–266, Figs 3, a and b; *Census* ID 43452. Marder 1989, p. 637, Fig. 20.

110 Florence, Uffizi, inv. 306 A r, 841 A r, 874 A r and v, 1241 A r, and 3990 A r; *Census* ID 43452. Cf. Nesselrath in Frommel-Adams 2000, pp. 134, 158–159, 171–172, 221 and 268–269, illustrations 347, 369, 380, 425, 476.

111 London, Sir John Soane’s Museum, Codex Coner, fol. 32 v; *Census* ID 46698. Ashby 1904, p. 29, no. 36. I wish to thank Sebastian Storz for fruitful discussions on this sheet.

112 A. Palladio, *I quattro libri dell’architettura*, Venice 1570, p. 73; *Census* ID 43487.

113 Richard S. Field, *The Illustrated Bartsch* 56 (Netherlandish Artists: Philipp Galle), New York 1987, p. 52, no. 5601.014:5. Horst Bredekamp, “Maarten van Heemskercks Bildersturmzyklen als Angriff auf Rom,” in *Bilder und Bildersturm im Spätmittelalter und in der frühen Neuzeit*, Wolfenbütteler Forschungen 46, ed. Robert W. Scribner and Martin Warnke, Wolfenbüttel 1990, pp. 203–216; see 203 and 211–213, Fig. 1.

114 Carlos Eire, *War against the Idols*, Cambridge 1986, p. 211. I wish to thank Horst Bredekamp for this reference.

115 *Don Quixote*, Part II, Chapter VIII, with grateful acknowledgment to the translator John Rutherford: Miguel de Cervantes Saavedra, *The Ingenious Hidalgo Don Quijote de la Mancha*, trans. John Rutherford, London 2000, p. 535; Miguel de Cervantes Saavedra, *El Ingenioso Hidalgo Don Quijote De La Mancha*, Edicíon Commemorativa IV Centenario, Madrid 2004, p. 484: *Quiso ver el emperador aquel famoso templo de la Rotunda, que en la antigüedad se llamó el templo de todos los dioses, y ahora, con mejor vocación, se llama de todos los santos, y es el edificio que más entero ha quedado de los que alzó la gentilidad en Roma, y es el que más conserva la fama de la grandiosidad y magnificencia de sus fundadores: él es de hechura de una media naranja, grandísimo en estremo, y está muy claro, sin entrarle otra luz que la que le concede una ventana, o, por mejor decir, claraboya redonda que está en su cima, desde la cual mirando el emperador el edificio, estaba con él y a su lado un caballero romano, declarándole los primores y sutilezas de aquella gran máquina y memorable arquitectura; y habiéndose quitado de la claraboyaa, dijo al Emperador. “Mil veces, Sacra Majestad, me vino deseo de abrazarme con vuestra Majestad, y arrojarme de aquella claraboya abajo, por dejar de mí fama eterna en el mundo.”*

116 Marder 1989, pp. 637–638; F. Lucchini 1996, p. 10 (without source reference).

Ten The Pantheon in the Seventeenth Century

Tod A. Marder

In the course of the seventeenth century, the Pantheon and its urban context were too dearly loved and too poorly understood to survive unattended. Elements of the building were restored, remodeled, and occasionally plundered over the century, while the urban context was repeatedly studied, reconceived on paper, and occasionally actually reformed. As an object of study, a source of emulation, and a challenge to preservation, the Pantheon was also enigmatic, a target of aesthetic criticism and a stimulus to "correct" architectural composition. In all of these regards, the history of the Pantheon in the seventeenth century largely reflects the kinds of episodes that took place over the previous millennium.

We need to recall that scarcely more than a half century after the consecration of the Pantheon to Saint Mary and All Martyrs, the Byzantine emperor Constans II organized the removal of the bronze tiles from the dome of the edifice in AD 663 and shipped them to Syracuse.[1] In the eighth century, Pope Gregory III replaced those tiles with lead plates. In 1270, a bell tower was installed atop the ridge of the pediment, in keeping with the increasingly common practice of marking the hours and church rituals throughout Rome in the thirteenth century.[2] With time, ancient buildings around the Pantheon were despoiled of their materials, many crumbling to the ground, while shops, vendors' stalls, and habitations were built against surviving remains. The process, deeply entrenched in the history of the site, continued well after prohibitions against such encroachments were published. Because the hastily constructed shacks and stalls were usually built of wood, fire was an ever-present danger, with falling timbers capable of causing the collapse of larger stone and masonry structures.

In fact, a fire seems to have caused the destruction of the entablature and the columns along the east-facing side of the portico, which were eventually replaced by a brick-and-rubble wall enclosing this corner of the famous facade.[3] As a result, the exterior of the portico assumed the asymmetrical appearance that we see in countless images from the Renaissance, such as in Figures 1.7, 9.1, and 9.2. The new wall obscured the loss of the columns, provided support to the east side of the portico and pediment, and dramatically separated the portico from the piazza. Eventually this separation was exaggerated by the rising height of the piazza, from which it became necessary to descend by stairs to the level of the portico (see Fig. 1.4). The sixteenth-century antiquarian Flavio Biondo claimed that a visitor had to descend as many steps from the piazza to the portico as were once necessary to ascend in order to enter the temple in antiquity. It was a matter of seven steps in the seventeenth century.[4] The damaged or missing columns and entablature were repaired or replaced in the seventeenth century in the course of two campaigns, as we shall see. Nevertheless, the threat of fire endured, as an anonymous nineteenth-century drawing of a *forno* (bakery) backed up to the rotunda testifies.[5]

Urban VIII and the Pantheon

Renaissance popes continued to attend to the maintenance of the Pantheon in various ways pertinent to

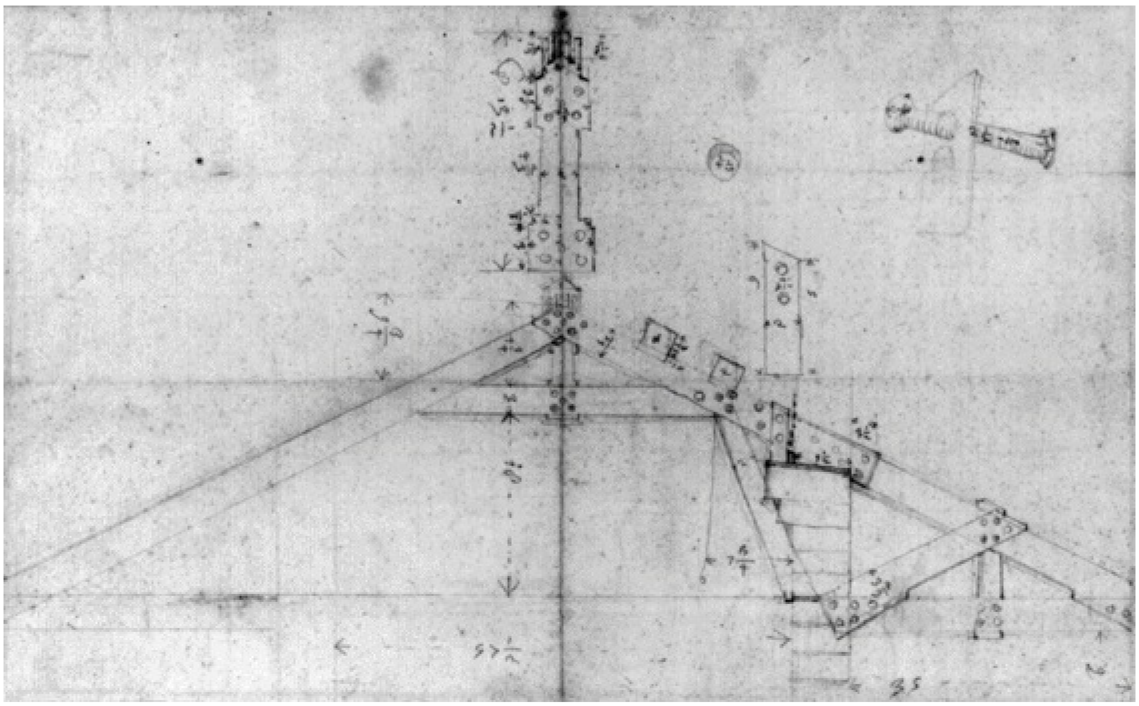
their seventeenth-century successors, as will be seen throughout this chapter, but the record is sporadic. Under Paul II (1464–1471), for example, we know that masonry in the portico was repaired, as were the timbering and terracotta tiles for the roof.[6] From this and many other notices pertaining to the piazza, we can be certain that the portico had a conspicuous place in the collective consciousness of Roman Renaissance antiquarians. Nothing more dramatically proves this fact than the outcry following the infamous despoiling of the bronze beams from the porch on the orders of Urban VIII Barberini in 1625. This incident gave rise to the well-known pasquinade satirizing the fact that a pope had dared to do what even the invading barbarians had never done – "what the barbarians did not do, the Barberini did" – *quod non fecerunt i barberi fecerunt i Barberini*. It mattered little that the bronze was later said to be destined for the casting of Bernini's Baldacchino for St. Peter's, rather than armaments for protecting the city.

This episode, recently clarified by Louise Rice, is more complicated and interesting than previously thought. Presented with the need for additional cannon to protect Castel Sant'Angelo, Pope Urban VIII (1623–1644) authorized the removal of the ancient bronze beams that had been studied repeatedly and drawn very often in the course of the sixteenth century (see Fig. 9.15). The new research clarifies three aspects of the operation pertaining to our interest in the reception of the Pantheon. First, it is now clear that the despoliation of the bronze, originally intended for cannon, was soon justified by the report of its deployment to the Baldacchino in St. Peter's, as a way to mollify Urban VIII's critics. Evidently, the sacred destination for the bronze was deemed more acceptable to critics than the defensive purposes that inspired the operation in the first instance. In truth, not a bit of the metal can be documented in St. Peter's, but it can be traced in the cannon of the period. So, in the reality of the day, defensive needs trumped antiquarian interests, but the antiquarian faction was not to be dismissed. This fact relates to a second revelation, namely, that the pope then embarked on a compensatory effort to restore the portico to its former glory, with significant results. Third, the operation inspired a debate about the original form of the portico's vaulting and how it should be treated after the bronze beams were replaced by timbers. In Rice's account, the removal of the bronze and its management from a public relations perspective reveal the depth of popular affection and erudite concerns for the ancient fabric in the seventeenth century.[7]

The papal order for dismantling the bronze was issued in August 1625. The stated reason for the operation was to use the material for *pezzi d'artegliaria* ("pieces of artillery") at Castel Sant'Angelo, but popular reaction was so swift that Urban VIII was immediately thrust into a defensive mode. By September, the Roman *avvisi* (news reports) attributed the pasquinade to Giulio Mancini, the learned Sienese doctor and author of a book on the art of painting. Although deeply concerned with the Pantheon, Mancini was also Urban III's personal physician, and so there is good reason to attribute the pasquinade to candidates less dependent upon the pope. All the same, the result was a counteroffensive to justify Urban VIII's orders and reestablish his good intentions. This is when he let it be known that the bronze would be used for a religious purpose, namely, the casting of Bernini's Baldacchino, and from then on, the dual destination of the spoils was widely broadcast.[8]

In fact, Rice calculates that 98 percent of the bronze was always earmarked for artillery, but because the material was brought to the foundry where both the Baldacchino and the papal cannon were manufactured, the pope's intentions were effectively "camouflaged." Those who knew of these matters recognized them as "a diversionary tactic," as Rice terms it.[9] Nonetheless, Urban's compensatory repairs of the Pantheon exceeded pure necessity and added conspicuously to the

appearance of the building. The bronze beams had to be replaced, of course, and careful drawings by Francesco Borromini demonstrate that considerable thought and skill went into the composition of timber substitutes, beginning with a detailed understanding of the ancient configuration (Fig. 10.1).[10] In 1626–1627, Borromini also repaired the missing column on the northeast corner of the portico and provided it with a newly made capital. This capital can be easily identified by the Barberini bee that was carved on the flower of the capital (see Fig. 1.19). Even more conspicuous than the refurbished corner column was the addition of the two bell towers to replace the single tower that had to be dismantled to pull the bronze structures from beneath it. Drawings by Borromini for the design and construction of the towers survive to attest to the origins of these towers in the workshop of the chief papal architect of the day, Carlo Maderno (Fig. 10.2).[11] The traditional but incorrect attribution of the towers to Bernini is ironic in view of the extensive rivalry between him and the Maderno-Borromini team. Could there be yet another level of dissimulation in the attribution of these new additions to the facade of the Pantheon, which were soon dubbed "the ass's ears" (*l'orecchie d'asino*)? It is difficult to know for sure, but the unfounded relationship to Bernini expresses independently the extent to which both the towers and he were associated, for better and for worse, with the Barberini pope. Even in the modern archaeological literature the misattribution survives.[12]

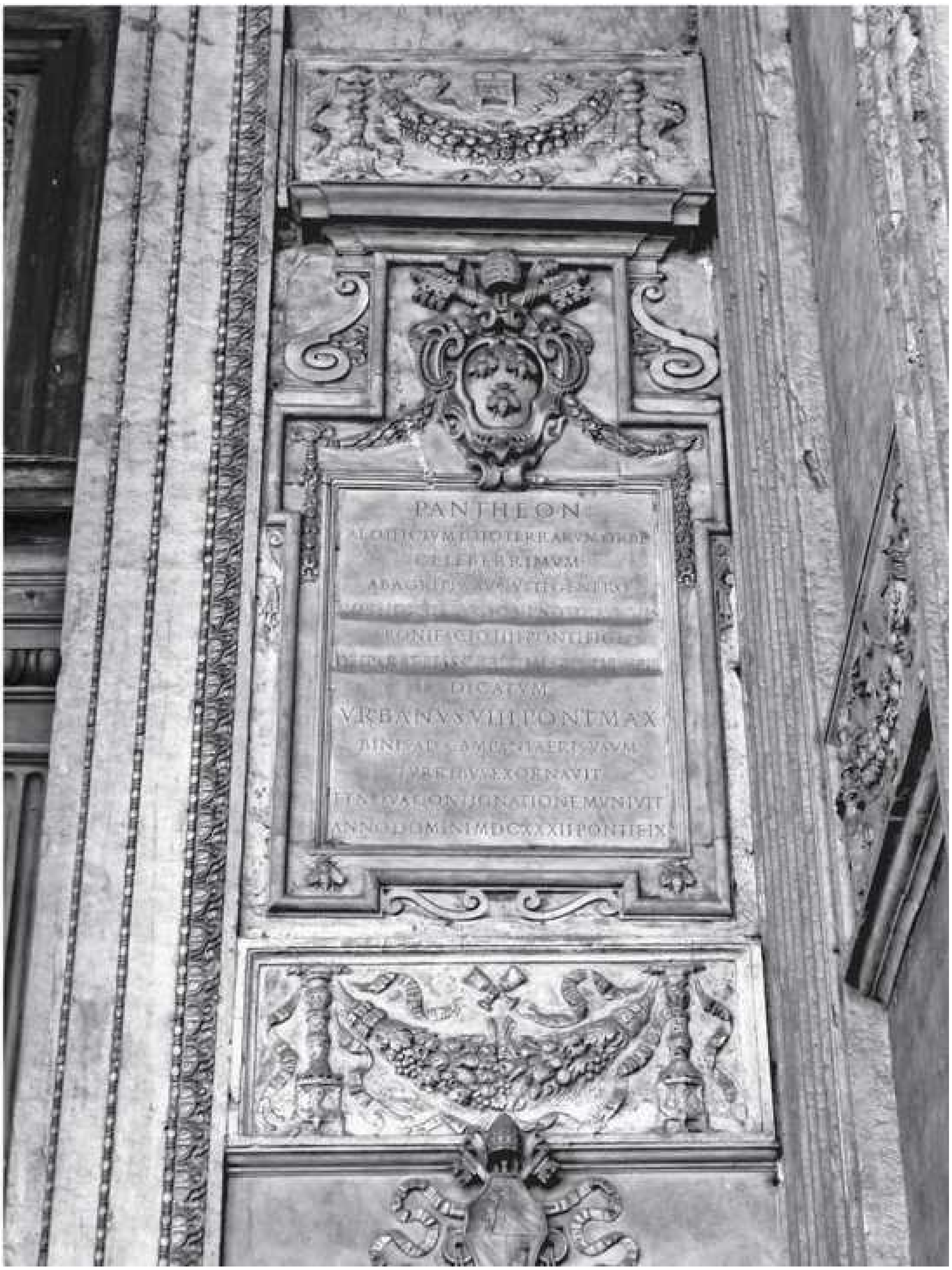


10.1. Truss work at the Pantheon; drawing by Francesco Borromini, 1625. (Albertina, Vienna)

(a)


VRBANVSVIIIPONTMAX
FIERENT
INVATICANOTEMPLO
APOSTOLICISEPVLCHRIORNAMENTA
INHADRIANAARCE
INSTRVMENTAPVBLICAESECVRITATIS
ANNODOMINIMDCXXXIIPONTIFIX

(b)



10.2 a and b. Inscriptions erected in 1632 by Urban VIII flanking entrance portal. (Photos author)

The work accomplished by Urban VIII was memorialized on two large inscriptions flanking the bronze doors into the rotunda (Fig. 10.2). The tablet on the left alludes to the ancient bronze trusses, “a useless and all but forgotten adornment,” for the embellishment of the apostolic tomb and the defense of the fortress of Hadrian (Castel Sant’Angelo). The tablet on the right refers to the pope’s restructuring of the roof and the construction of the twin bell towers. Both inscriptions were posted in 1632.[13] In the years leading up to their appearance, while the Barberini distributed huge bronze bolts (pictured in Borromini’s drawing) from the ancient trusses as souvenirs, it is yet another irony that antiquarians busily debated the merits of completing a flat or vaulted ceiling in the portico in order to hide the trusses replaced in wood and to embellish the building in a manner befitting its heritage.[14]

Neither of theseplans was put into effect, but they reveal the ambitions of seventeenth-century thinking about an ancient Roman building.

In both the old and the new roof system, the supporting members were braced on rough-finished masonry above the columns of the portico, which can be seen in photographs and drawings (Fig. 10.3). Nevertheless, the configuration of the ancient bronze trusses differed from their later wooden counterparts in a number of ways. The differences may be revealed to some extent by comparing Borromini's scheme and any Renaissance drawings of the trusswork, although we must be careful to account for the variations in the latter that were not always done from on-site observation. In her analysis, Rice argues that the unusually compressed aspect of the ancient configuration may itself be an improvised solution devised in antiquity for a portico that was originally intended to be taller. This is an important suggestion because it is consistent with the theory of Mark Wilson Jones regarding a possible change in the size of the columns during construction. Thus, as a corollary to the suggested shift in the scale of the columns in ancient times, there would have been a concomitant change in the design for the trusses and the height of the roof of the portico.[15]

10.3. Truss work in portico. (Photo author)

The comparison of the ancient with the seventeenth-century truss systems could help us to envision the insertion of a barrel-vaulted ceiling under the ancient roof, whereas the Borromini scheme does not appear to leave adequate space for such a vault to span the wide central bay of the portico. In fact, the debate about a vault or a flat ceiling was ultimately left undecided and the project unexecuted, whether for lack of technical resolution, authenticity, or matters of funding. Two manuscript accounts of the issue survive to describe the considerations, one likely by the pope's doctor, Mancini, the other anonymous.[16]

As it happens, both authors endorsed the concept of a barrel vault over the central entrance axis. In

the fashion typical of seventeenth-century dialectic, the objections are fully aired: false ceilings are more stable and cost less; the ancients never set vaults on columns; all vaults exercise lateral thrusts that would make them inherently unstable at the Pantheon; and resolving this instability with iron tie rods was unacceptable because the ancients never used them. To these objections, the anonymous author insists that vaults are stronger and more beautiful than false ceilings; that the ancients had indeed set barrel vaults on columns (and cites examples); that a properly constructed vault would produce no lateral thrusts; and that architects often make use of techniques unknown in antiquity. Both Mancini and the anonymous author agree that vaulting would complement the magnificence of the entire building, especially the dome. Mancini maintains that flat ceilings would compromise the portico's airy dimensions, which had already been reduced by the accretion of soil burying the columns and portions of their shafts, no doubt referring to those bordering the piazza. In the end, no solution proved practical in the context of the new timbering for the portico, and so it remained – perhaps since the change in scale of ancient columns – an unfinished aspect of the most finished Roman building to come down to us, "a sort of ruin within a building otherwise intact," in Rice's felicitous phrasing.[17]

Reading the Interior of the Pantheon

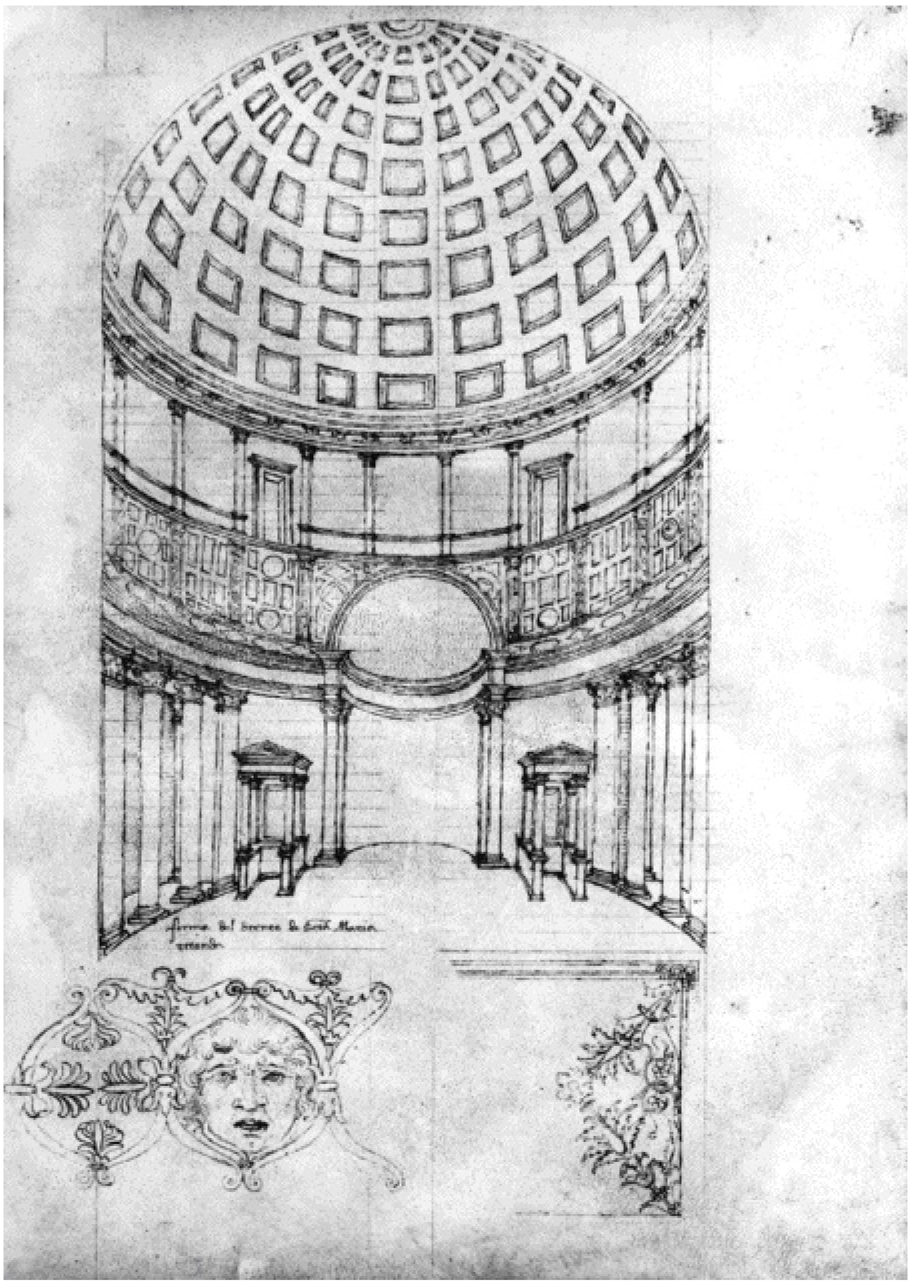
In several brief but fundamental publications, Tilmann Buddensieg showed how the ancient Pantheon stimulated both admiration and criticism in the Renaissance and afterwards.[18] Acknowledgment of the Pantheon's design "faults" still comes as something of a shock because of our natural inclination to regard it as an authoritative model of ancient architecture for the early modern period. The truth is that over the centuries and right up to the present, scholars and architects have continued to observe some subtle but unusual, and sometimes inexplicable, features in the building whose character is anything but self-evident. Some of these features have been discussed in previous chapters in this book. Efforts to understand the structural realities and decorative logic of the Pantheon have been recorded since the fifteenth century and have continued to tease antiquarians into the eighteenth century and up to our time.

Indeed, many of the difficulties in comprehending the edifice in the Renaissance were the same as those we face today: what explains the awkward formal connection between porch and rotunda, the apparent disjunction between paving patterns inside the rotunda and features of the elevation, or the apparent dissonance between the vertical lines of the main order, the smaller order in the attic, and the ribs of the dome? Observations on these issues and others have stimulated commentary in writings and drawings for centuries and compose some of the most sustained analyses and criticism in the whole history of architecture.

A prominent catalyst for these commentaries was the attic zone of the interior, that portion of the elevation located between the entablature of the main order and the springing of the dome. For visitors then as now, it is obvious to see that the little pilasters, or *pilastrini*, of the attic are not consistently aligned with the grand Corinthian order rising from the pavement nor are they aligned with the ribs of the dome above them. (See Plates VII and X. For reasons mentioned in our Introduction (Chapter One), the pilastrini today survive in just a small section of the attic.) It appears as though this conspicuous portion of the composition of the Pantheon, a touchstone of ancient Roman architecture, violates a fundamental classical ideal, namely, that vertical components of an elevation

be precisely aligned over one another, not partially and not over the void of a niche or in the middle of a bay.[19] The assumed rule was: solid over solid, void over void.

In the fifteenth century, Francesco di Giorgio Martini reconstructed the Pantheon in a drawing that appears to correct this apparent defect by inventing a second attic register and inserting it below the dome with a reduced number of pilastrini (Fig. 10.4). Moreover, he aligned his pilastrini with the ribs of the dome, in the process changing both the number and the position of the coffers.[20] If Francesco's were an isolated example of the phenomenon, we could attribute these features to inaccuracies generated by an artist working off-site or perhaps from a description, but this is just one of many examples of drawings and illustrations that consciously propose revisions to the composition of the ancient building.



10.4. Project to refashion interior elevation of the Pantheon; drawing by Francesco di Giorgio, fifteenth century. (Biblioteca Reale, Turin, Saluzzo 148, fol. 80)

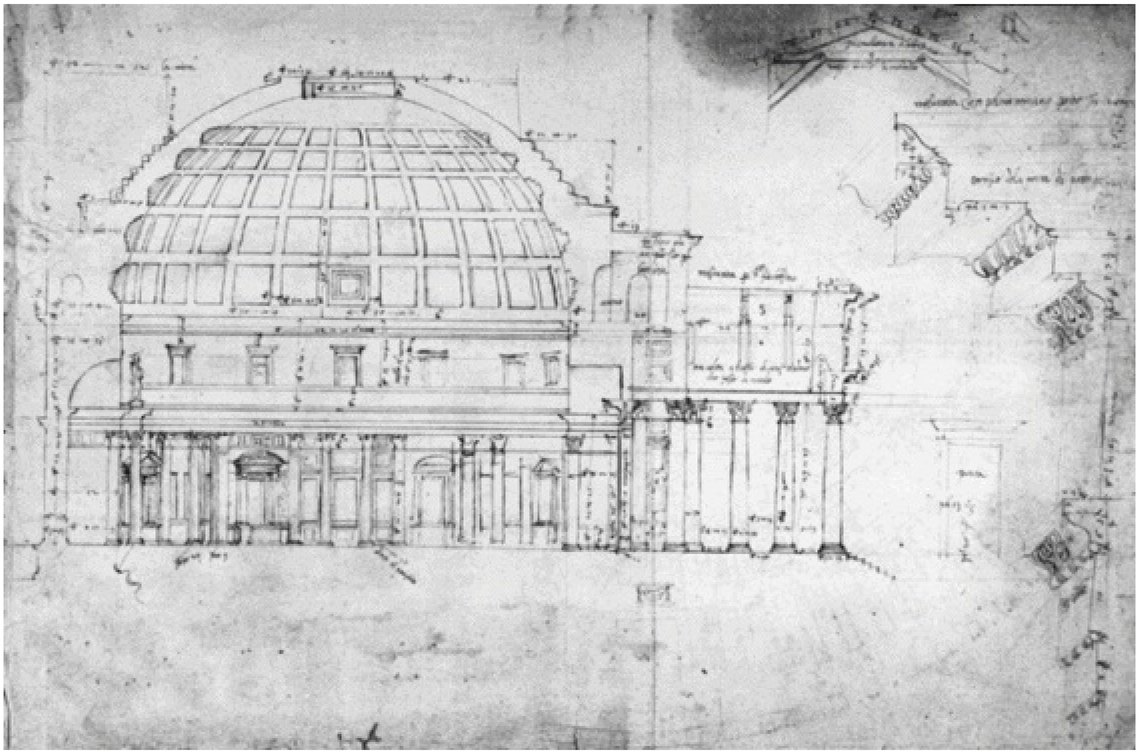
To take a widely circulated example, we can turn to the printed treatise on architecture by Sebastiano Serlio. The illustrations appear in his Book Four, which was initially published in 1540

and is generally considered to be one of the first publications in architectural history to provide illustrations of a substantial canon of ancient buildings.[21] The book illustrates the interior and exterior elevations of the Pantheon and includes many details. One of the details demonstrates how the woodcut alters the elevation so that the disposition of the main order, the small attic pilasters (the pilastrini), and the ribs of the dome are vertically aligned with one another, whereas this is not the case in the monument itself and never was (see Fig. 1.17). While purporting to present the interior of the Pantheon faithfully, Serlio has willfully "corrected" its composition to conform to his own expectations.[22]

Antonio da Sangallo the Younger also engaged the issue of vertical alignments in annotated drawings that also take the ancient architects to task over the composition of the portico and the disposition of the columns within the building (see Fig. 1.15). He draws attention to "another error" inside the Pantheon, which is that the pilastrini and the columns are not spaced uniformly and the upper pilasters do not fall uniformly over the orders below or coordinate above with the ribs of the vault, which he terms a "most pernicious thing."[23]

Not all Renaissance antiquarians and architects indulged in this sort of criticism, and few expressed themselves as clearly as Sangallo. In striking contrast to his drawings and commentary and to Serlio's blatantly inaccurate illustrations of the Pantheon, Andrea Palladio's illustrations of it faithfully record the monument as it stood, insofar as we can determine.[24] His woodcuts accurately illustrate, for example, how the windows of the attic are located above each pier and each of the principal niches (see Fig. 1.18). He also faithfully captures the lack of vertical alignment between the pilastrini of the attic and the Corinthian orders that spring from the pavement. (Palladio's detailed image of the elevation does not extend above the attic into the dome area, perhaps to avoid presenting the apparent "misalignment" of the dome's ribs with the pilastrini and the principal order below them.)

Possibly influenced by these concerns, some Renaissance architects preferred simply to omit the pilastrini of the attic when they drew the interior elevation of the Pantheon. In a beautifully detailed longitudinal section, Baldassare Peruzzi minutely annotated each feature with dimensions but leaves the attic unarticulated save for the windows located above each niche and pier (Fig. 10.5). Similarly, the transverse section of the drawing by Bernardo della Volpaia in the Codex Corner shows a blank attic, bare and uninterrupted but for its windows (see Fig. 9.19). While our sources do not explicitly reveal the reasons for omitting the pilastrini on these drawings, the architects would surely have been aware of the formal concerns we have mentioned. Could they have suspected, like many later observers did, that the polychrome revetment of the attic was added to the Pantheon when it was rededicated to Christianity? We cannot be certain.



10.5. Longitudinal section of Pantheon; drawing by Baldassare Peruzzi. (Biblioteca Comunale Ariostea, Ferrara)

It is likely that Michelangelo had some of these formal considerations in mind, even when he praised the design of the attic's windows as "most graceful," the portico as a "thing most precious," and the interior design as "angelic and not human." Angelic and not human, Michelangelo maintained, but only up to the main cornice (*dal primo Cornicione in giù era disegno angelico, e non umano*).[25] Like earlier and later students of the building, Michelangelo believed that the Pantheon was the product of three different architects and three separate phases, which included the rotunda, the dome, and the portico. As Vasari recounted it, Michelangelo believed that the first architect would have brought the building to the height of the large cornice; the second from the cornice to the top of the dome, including the "genial" form of the windows; and the third architect was responsible for that "most singular" portico.[26] For our purposes, it is important to note that Michelangelo's judgment was known and quoted in the seventeenth century during the pontificates of both Urban VIII and Alexander VII.[27]

We can be sure that these concerns retained their currency in the seventeenth century by referring to the notations of Inigo Jones while in Rome on "ye last of May 1614."[28] In his personal copy of the 1601 edition of Palladio's *Quattro libri*, Jones attempted to note "more then is in Palladio," regarding the details and dimensions of the Pantheon, thus to correct or dilate upon issues of contemporary interest.[29] The process is interesting as much for Jones's keen observations as for his critical attitude toward Palladio and toward the Pantheon. For example, he criticized his predecessor's rendition of the stairs in the intermediate block: "Palladio makes not these staires as they ar but as he conceaves they should be but this is too great liberti." Observing the interior of the rotunda itself, Jones does not hesitate to criticize the ancient elevation in familiar ways. He warns: "Noat the ribes of this volte answears with nothing below yt. Not to be Imitated. / The second order had in my opinion better had been an Opera bastarda, for so yt is now in effectte." By this he means wall strips without proper bases or capitals, as on the upper story of Bramante's Tempietto, which

Jones also referred to as an "opera bastarda."[30] On the lower margin of the page illustrating the Pantheon, Inigo referred to "A drawing of this sumwhat otherwyze," suggesting that he, like many others, had imagined and drawn a scheme with improvements on the ancient composition of the Pantheon. His drawing remains unidentified.

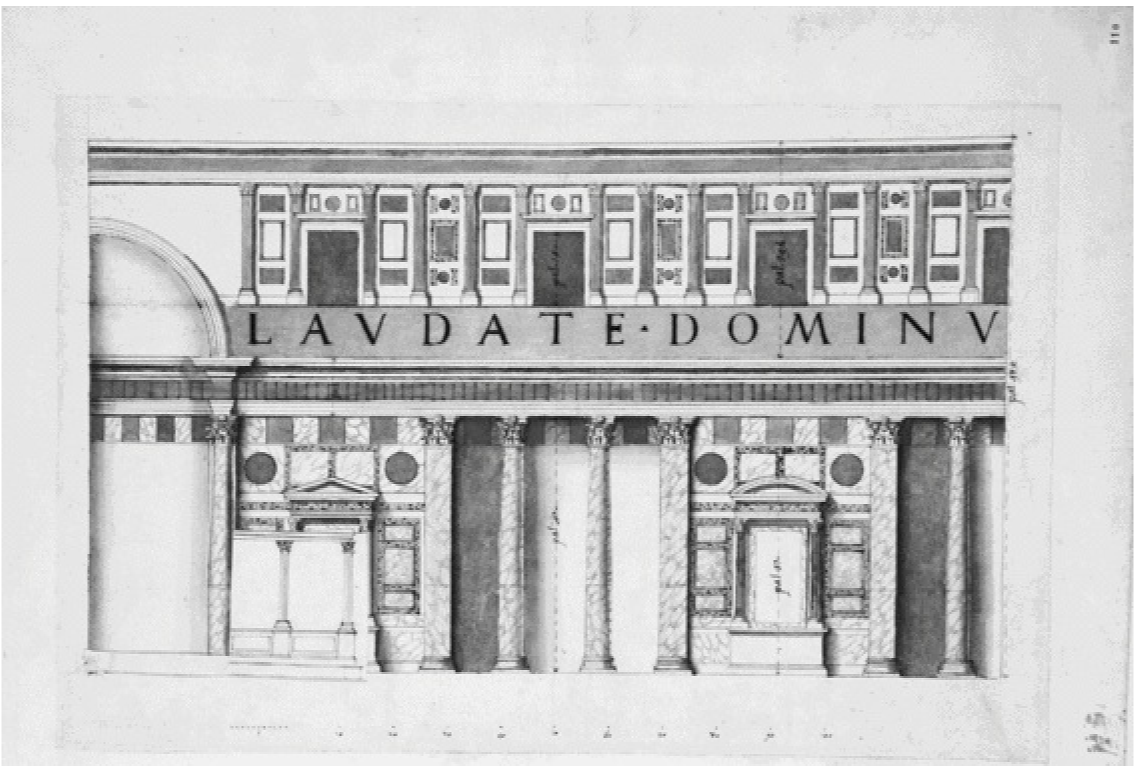
Eventually, it seems to have been Bernini who first explained how the pilastrini of the attic corresponded to the order of the pilasters and columns rising from the pavement. In an insight laden with associations for the term "baroque" in the visual arts, he explained the correspondence as one of rhythm and proportion rather than superimposition. Thus, when his patron, Pope Alexander VII repeatedly asked him to "enliven" the dome of the Pantheon, Bernini refused. Maintaining that he lacked the talent necessary to do anything of the sort, Bernini professed a willingness only to paint the pilastrini in the attic if money were lacking to replace them in genuine marble. His refusal, we are told, was highlighted by an aperçu meant as much to reveal the nature of the design as to argue for its preservation. For he justified his refusal by a clever reading of the attic that his predecessors had missed: "Having recognized that the pilastrini with their associated placement and proportions corresponded to the order rising from the pavement – that there was the same symmetry and eurythmy – with the judgement of a truly great man, measured and modest, Bernini said that he did not have the skill to make any changes."[31] In short, Bernini had recognized that the rhythm of the units of four pilastrini at the attic level, separated by the windows, conformed to the four-part pilaster-and-column groups across the niches of the lowest level, separated by the main piers.

This exchange is recorded in a document of 1762 known in two copies. It takes the form of a letter addressed to the young architect assigned to complete the design of the Trevi Fountain after the death of Nicola Salvi in 1751. Salvi's successor was Giuseppe Pannini, son of the painter, who was hired to finish the fountain at a time when much of its temporary sculptural decoration remained to be executed in stone. The letter describes how Bernini, a century earlier, had considered the ancient decoration of the Pantheon as perfect and therefore "incapable of change or correction by any other later architect." The purpose of the letter was to admonish the young, newly appointed architect of the Trevi fountain to be similarly faithful to the original decorative scheme he had inherited from Salvi. The author of the letter was probably Salvi's brother, which would explain the partisanship of the writer, who elsewhere in the letter addresses Pannini in the diminutive as *l'architettino* (literally: "little architect").[32]

It is just possible that the eighteenth-century writer himself stumbled on a reading of the Pantheon, which he then attributed to Bernini and which resolves a problem that disturbed Francesco di Giorgio, Peruzzi, Sangallo the Younger, Michelangelo, and many other sixteenth- and seventeenth-century architects. Alternatively, another still-anonymous source might be credited with the insight. Yet the simplest and most sensible conclusion is that the anecdote about Bernini's refusal to honor Alexander's request to enliven the interior of the Pantheon reflects events, and that Bernini's insight was based on his ability to appreciate an aspect of the building that had confounded his predecessors. If this reading of the evidence is accepted, Bernini may be identified as the first observer to explain the apparent anomaly in the scansion of the attic pilastrini of the Pantheon.

In short, Bernini was arguing that the ancient architects of the Pantheon had recapitulated the rhythmic sequencing of the main order of the rotunda in the minor order of the attic. He may even have arranged to illustrate the matter in a large wash drawing that is usually associated with his studio (Fig. 10.6). Thus, the pilasters of the main order are more widely separated than the spaces between

the adjoining columns. The result is an "a-b-b-b-a" rhythm, which is the same as the rhythm that can be observed between the windows of the attic.[33] Likely, the observation had escaped Renaissance architects because their understanding of classical composition did not embrace such rhythmic complexity, despite numerous examples of it in other ancient monuments, such as Trajan's Baths (see Chapter Five). The notion of superimposed rhythms of varying proportions appears in ancient Roman architecture, like the Porta dei Borsari in Verona, which was well known in the Renaissance.[34] Here, the syncopation of horizontal cadences and the inversion of relief levels obliterate vertical consistency. By contrast, Michelangelo was unwilling to acknowledge the precedence of horizontal over vertical consistency, as in his designs for S. Giovanni dei Fiorentini, where the attic register continues the lines of the main order, but the diminished scale of the higher components is not accompanied by a proportional reduction in their lateral spacing.[35] Had Michelangelo shared Bernini's vision, the designs for S. Giovanni dei Fiorentini would have incorporated diminished spaces between the order on the attic and those on a larger scale rising below them.



10.6. Elevation of Pantheon with portion of old high altar drawn on flap (lower left); wash drawing from Bernini workshop. (Biblioteca Apostolica Vaticana, Chigi P VII, 9, fol. 110)

All the same, Bernini's understanding of these matters was not widely held. In a manuscript of 1707 accompanied by drawings in the Soane Museum, the Scottish architect James Gibbs described the interior of the rotunda with an "Attick adorned with small pilasters, which neither answer to ye upright of the columns below them, nor to the ribs betwixt the large panels in the roof above them, and has a very bad effect." In his drawings, he indicates "the Small pilasters over ye great columns, neither conforming to ye ribs ... of ye Cupola above them, nor ... ye columns below them." As an antidote, he drew "the Attick keept plain, much better than with ye small pilasters, having no proportion to ye great Columns."[36] It is likely that Gibb's remarks reflect the state of studies among contemporary scholars of the monument, for he resided in Rome (1703–1708) and trained in the studio of Carlo Fontana. He had actually taken his drawings from the engravings of Fontana's *Templum Vaticanum* of 1694, except for the fact that Fontana preferred to populate the attic with

caryatids. Fontana located these caryatids directly above the shafts of the main order in an effort to correct the problem recognized by previous generations of architects (see Fig. 11.2).[37]

Alexander VII and his Interior Embellishments

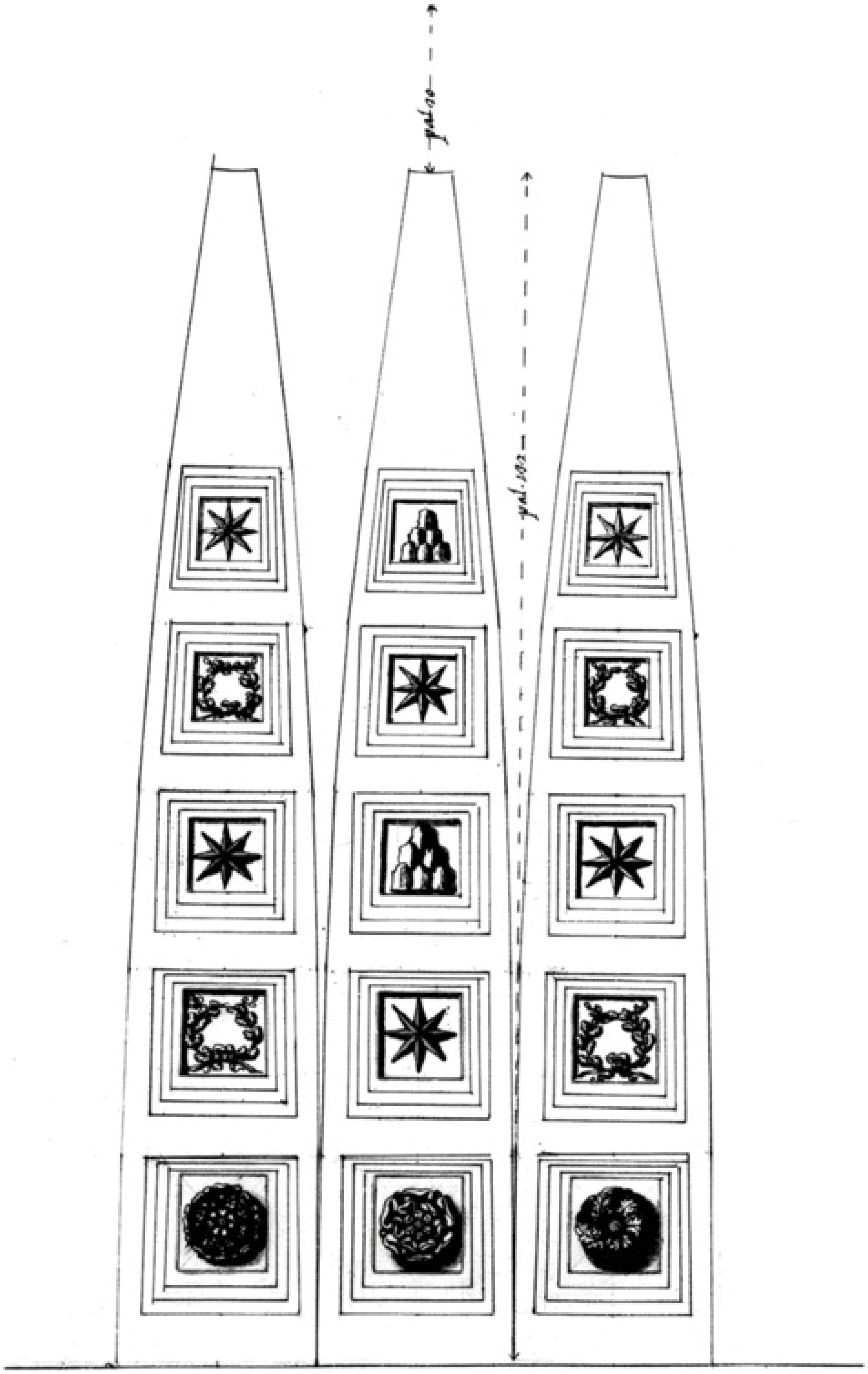
When Alexander VII Chigi (1655–1667) requested Bernini's assistance to "enliven" the Pantheon – and the artist responded three separate times in the negative – it is likely that the pope based his decorative aspirations on the belief that the interior had been sculpturally embellished in antiquity and that the attic in particular had been redecorated when the building was rededicated to become a Christian church. The *locus classicus* for the caryatids that appear in Fontana's engraving is Pliny the Elder's *Natural History* 36, 38, but Pliny (d. AD 79) is unclear about the location of the figures in Agrippa's edifice. They were sometimes interpreted as decoration for the portico, or belonging to the major order of the interior, or within the niches of the rotunda, but no one had suggested yet that they belonged at the level of the interior attic. Famiano Nardini's magisterial *Roma antica*, published in 1665 and well known to Alexander VII, concluded that one simply could not determine "in what part of the Pantheon they were or could have been." But that did not stop an investigation of other ancient sources like Dio Cassius and Vitruvius, or the early modern writings of Flavio Biondo, Michelangelo, or Ludovico Demonzioso, all of whom are cited in the Chigi archives.[38]

Carlo Fontana, who had served as Bernini's assistant at St. Peter's but also followed an independent practice, subscribed to the notion that the Pantheon had been built in stages. The original structure, he maintained, was a Roman Republican building to which Agrippa had later added a portico. At the same time, Fontana believed, Agrippa had also added a corresponding Corinthian order to the interior of the building, which had previously consisted only of arches. Fontana believed that to cover the upper zone of the old arches and fill the margin between the new order and the springing of the dome, Agrippa had employed caryatid figures directly above the main order of columns and pilasters. Although he does not explain why, Fontana concluded that the caryatids in the attic register were replaced by the pilastrini when the temple was exorcised and converted to Christian purposes. At this time, presumably, the vertical accents on the attic were applied without regard for their correspondence to the lower order; but no account is given of the apparent dislocation of the pilastrini from the ribs of the dome. These relationships are clearly illustrated in Fontana's engravings, which include the *prima edificazione* and above it the Pantheon with *ornati fatti da Agrippa*.[39] (See Fig. 11.2 and comments by Susanna Pasquali in Chapter Eleven.)

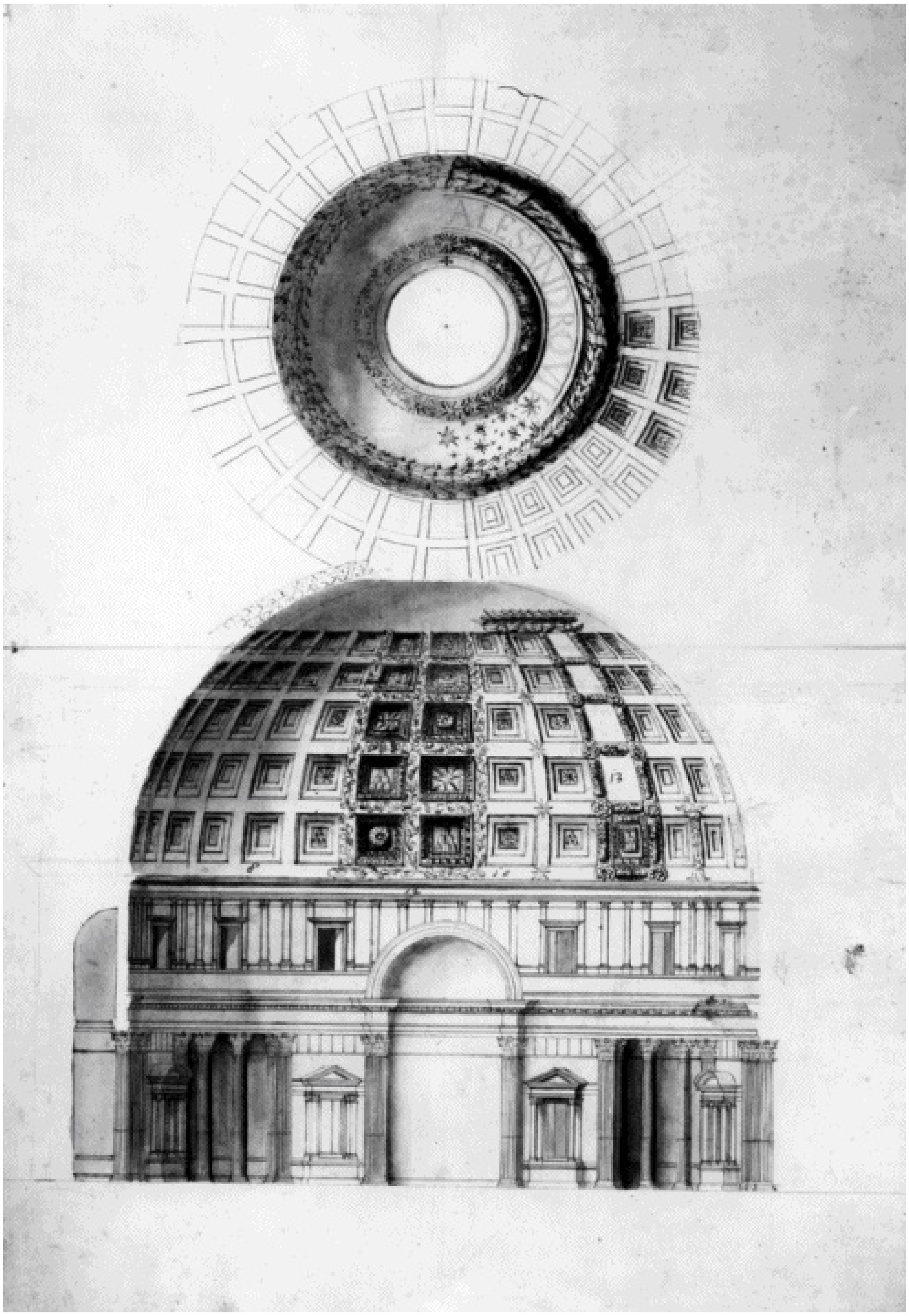
From this exposition in text and image, Fontana appears to have given form to Alexander VII's ambitions in several ways. For example, Fontana maintained that while Agrippa did not erect the dome, he did plan to provide it with stucco ornament. And Fontana praised Alexander VII for ordering the dome encrusted with stucco decoration "in the way it was formerly," that is, in antiquity. In a similar spirit, wrote Fontana, Alexander intended to decorate the attic with large figures of angels set directly above the Corinthian columns in place of the ancient caryatids once located there. The angels were to be conceived, scaled, and posed so that they would appear illusionistically to support the cornice on which the dome rests. Somewhat wistfully, then, Fontana informs us that the work was cut short by Alexander's death and that some of the stuccoes that had recently been realized were removed. In any event, there can be little doubt that Alexander had intended for Bernini, a master of illusionism in figural sculpture, to provide the *angeloni* who were to be placed and posed

to appear almost magically to support the dome.

The seriousness of Alexander VII's intentions can be gauged by his orders in 1666 to "finish the Rotonda" with money he was allotting to the operation. A report in 1667 that scaffolding was being built in the interior "to embellish the whole with stuccoes" proves that work moved forward.[40] Although his successor, Clement IX Rospigliosi (1667–1669), had the decorations removed, remains of Alexander's work are visible on the surface of the dome in the version of Pannini's famous painting now in Copenhagen. (See Fig. 11.1 and the comments by Pasquali in Chapter Eleven.) Other evidence of his goals are to be seen in two drawings for coffer decorations composed of the Chigi family arms (six-pointed star, six mounts, intertwined laurel). One drawing shows three vertical portions of the dome with decorated coffers (Fig. 10.7). The other drawing is a carefully drawn transverse section of the rotunda, with additions of the proposed decoration to the coffers added in another hand. Above the transverse section is a view into the dome with Alexander's name and the family stars deployed around the oculus (Fig. 10.8). There is no evidence that the precise features in either drawing were realized in the Pantheon and, as I have argued extensively elsewhere, neither of these drawings can be attributed to Bernini.[41] They represent the vision of his patron, a learned Sienese pope who wished to mark the Pantheon with his own erudition and presence. The nature of these ambitions no doubt led his successor to pull down some of his decorations.



10.7. Project for decorating the coffers with the arms of Alexander VII Chigi; ink and wash. (Biblioteca Apostolica Vaticana, Chigi P VII, 9, fol. 113 r)



10.8. Transverse section showing proposed coffer decorations; drawing in several hands from workshop of Carlo Fontana. (Biblioteca Apostolica Vaticana, Chigi P VII, 9, fol. 111–112)

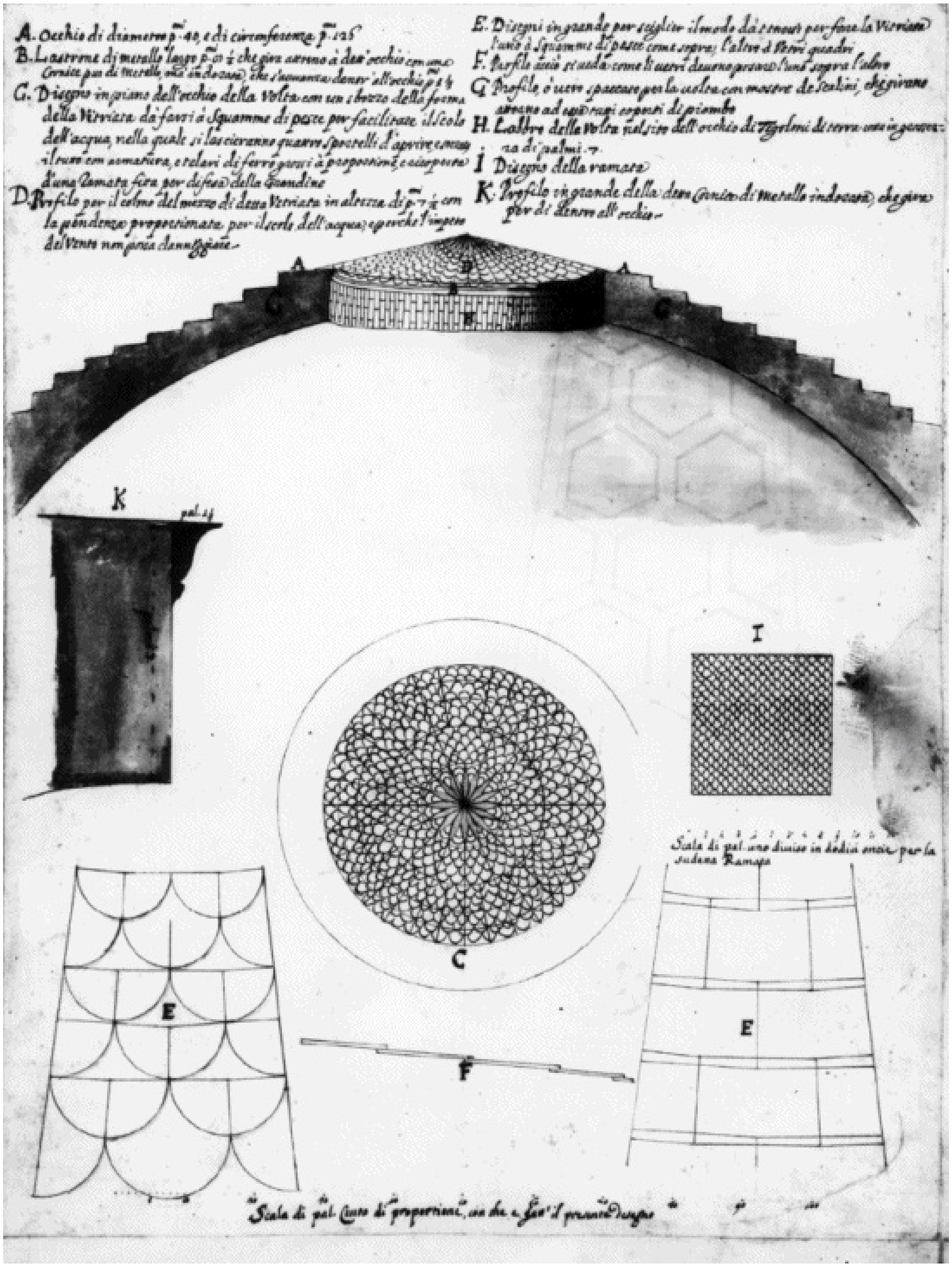
Longer lasting were the inscriptions from Psalms 149–150 that Alexander had ordered painted on the unbroken surface above the entablature of the main order and below the attic level. On the left (east) side of the rotunda, one read the words LAUS EIUS IN ECCLESIA SANCTORUM (Let His Praise be in the Church of the Saints); on the right (west) side, upon entering one saw the words LAUDATE DOMINUM IN SANCTIS EIUS (Praise the Lord in His Sanctuary). Clearly visible in Pannini paintings, the inscriptions commemorated Alexander's deep regard for antiquity in the service of the Church, even referring to the function of the Pantheon (Santa Maria ad martyres) as a burial site for all martyrs (see Plate II). Once again, however, fate intervened, for the inscriptions were obliterated during the eighteenth-century refashioning of the attic (Plate VIII).

To a great extent Alexander VIII's attitude followed in the tradition of other papal caretakers of the

Pantheon, from Gregory III (731–741), who covered the dome anew after the despoliation of Constans II, to Martin V (1417–1431) and Eugene IV (1431–1447), who continued this work, to Nicholas V (1447–1455), whose lead roof tiles still exist (see Fig. 9.14).[42] Later campaigns devoted to providing lead tiles for the roof were recorded under Pius II (1458–1464) and Clement VII (1523–1534), and surely others as well. On the other hand, there was a compulsive aspect to Alexander's attentions, which spanned his entire pontificate. In the spring of 1655, for example, during his first pontifical year, he ordered an inspection of water damage to the dome. Late in the summer of 1656, he sent Borromini to examine the bronze doors of the Pantheon and how they were hung (*la positura*), surely to determine whether they were ancient despite their unusual composition with a grating above the leaves.[43] In 1662, he spent successive evenings studying *l'occhio della Rotonda* ("the eye of the Rotunda") in drawings and a clay model of the building. He commissioned a study of the stone that composed the surviving pavement (see Plate V), and his architects studied the possibility of glazing the oculus to prevent further water damage. Many of his projects were concluded just months before his death.

In the mid fourteenth century, the mystic Hermann of Fritzlar had maintained that demons had opened the oculus in an effort to escape the building upon its Christian consecration. By the sixteenth century, concerns were more prosaic. A scheme for covering the oculus to prevent water infiltration had been mooted in 1591, during the brief papacy of Innocent IX Facchinetti (October to December 1591) under the architectural guidance of Giacomo Della Porta.[44] Della Porta knew the potentially destructive power of rainwater and must have been especially concerned about it, as he had brought the Acqua Vergine to the piazza in front of the Pantheon and constructed the fountain there in 1575.[45] His scheme for covering the oculus took the form of a wooden lantern to be covered by lead. With the same proposal, Della Porta also advocated the construction of a new sewer for drainage around the exterior perimeter of the rotunda. With Innocent IX's death, however, the proposals came to nothing.

By contrast, Alexander's project was considerably more sophisticated and came with greater resolution for its construction. The Alexandrine project called for a system of glass pieces arranged "in the manner of fish scales" over a low, conical framework of metal splayed around the points of a star-shaped termination, reminiscent of the pope's family symbol (Fig. 10.9). Repeatedly mentioned in the last year of the pontificate, it was to be installed by using the same scaffolding erected to mount the decorative stuccoes in the coffers of the dome. Noted in April 1667, less than a month before Alexander's death, the mission to close the oculus of the Pantheon once again came to an inglorious conclusion, and the eye to the sky remained uninterrupted.[46]



10.9. Project for glazing the oculus of the Pantheon; ink and wash drawing from Bernini workshop. (Biblioteca Apostolica Vaticana, Chigi P VII, 9, fol. 114 r)

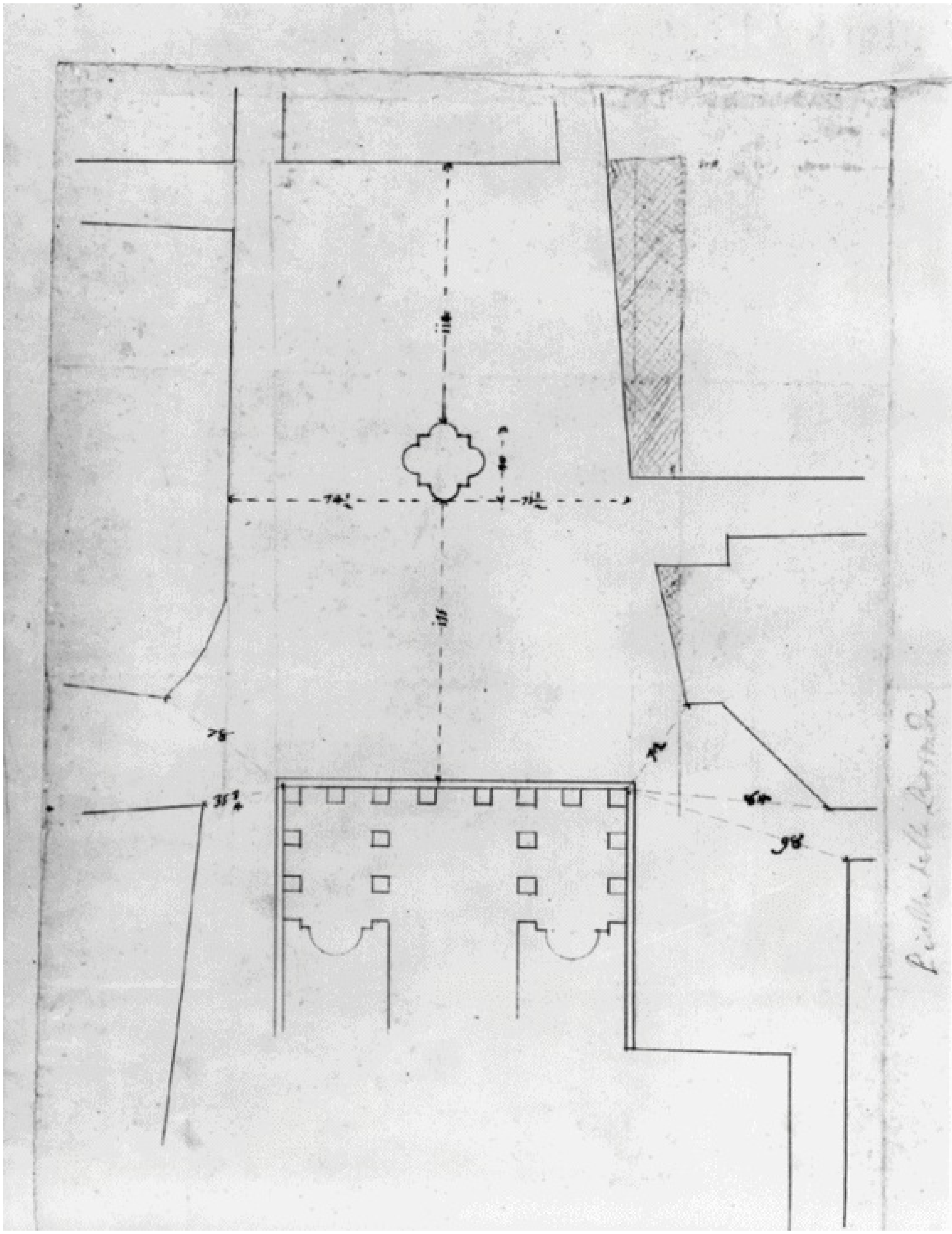
Evidently, the notion of glazing the oculus survived into the early eighteenth century, when James Gibbs claimed that "there can be no reason against it, unless it to be the folly of some whimsicall Antiquarys" and indeed the proposal resurfaced only to be rejected in 1758 (see Chapter Eleven). So far as the literature indicates, the oculus has remained open from antiquity to our day, still a surprising fact for visitors who arrive on a rainy day to discover the center of the pavement wet, slippery, and roped off for safety.

Alexander VII and Piazza della Rotonda

As in other aspects of the Pantheon's history, there was a long background to seventeenth-century efforts to clear Piazza della Rotonda. Flavio Biondo's *De Roma instaurata,* published by 1446, explains how Eugene IV (1431–1447; the book is dedicated to him) uprooted the "squalid little market stalls" in the portico and cleared the portico's column bases of their accumulated filth "to better reveal the beauty of this wonderful building."[47] He probably also had the piazza paved. This in turn must have given rise to questions about jurisdiction over the piazza, for in 1442, during Eugene's exile in Florence, Romans protested the execution of two citizens by papal authorities. Part of the protest involved ransacking Piazza della Rotonda and the portico when, according to the diarist Stefano Infessura, "all the roofs of Santa Maria Rotonda were destroyed, and the piazza was ruined and afterwards, all the market stalls alongside the columns of the portico were demolished."[48] I take this to refer to the roofs of vendors in the portico, which are so prominent in Figures 1.7 and 9.1, and to the market stalls that were located on the piazza. These merchants paid rents to the Chapter of Santa Maria della Rotonda, and destroying their booths and stalls was a form of rebellion against religious authority. New ordinances to clean the piazza at least once a week and to restore the paving realized by Eugene IV were issued under Clement VII (1523–1534).[49]

The intersection of finances and jurisdictions often conspired to limit the power of successive popes to rid the Pantheon of the encroachments that weakened its structure and compromised its appearance. More than any other force, it was the Chapter of Santa Maria della Rotonda that insisted on the presence of the markets and vendors on the piazza, despite the goal of antiquarians to liberate the building of parasitic activities. Their vision is the one most often recorded in Renaissance drawings, which often indicate that commercial activities were fully accommodated within the portico (Arnold Nesselrath characterizes it as a kind of "covered market"), while the piazza was barren but for two Egyptian lions in granite and a massive porphyry urn. The lions were commandeered for the Moses Fountain in 1586, and the urn was first put under the portico and then incorporated in the Corsini Chapel in S. Giovanni in Laterano. In truth, the record over time suggests a battle between economically healthy squalor and a comely space barren of commerce.

A key step in the development of the piazza took place in 1575 when Della Porta constructed the fountain that still provides an ancillary focus of interest on the site. A measured plan made for Alexander VII illustrates how the fountain was situated with reference to the dimensions of the piazza, rather than to the axis of the Pantheon (Fig. 10.10. The fountain, which has never been moved, is located slightly to the west of the north–south axis of the Pantheon in order to conform more closely to the center of the space than to the Pantheon's axis. Moreover, Della Porta rotated the axes of the fountain to be more closely aligned to the flanks of the piazza than to those of the portico. Some of these subtleties can be observed on the site: standing at the north side of Piazza della Rotonda and looking south, one sees that when the apex of the dome is aligned with the peak of the pediment, the fountain (and its eighteenth-century embellishments, including the obelisk) will appear offset to the west.[50]



10.10. Plan of Piazza della Rotonda with proposed changes on east border; anonymous drawing, ca. 1660. (Biblioteca Apostolica Vaticana, Chigi P VII 9, 106 r)

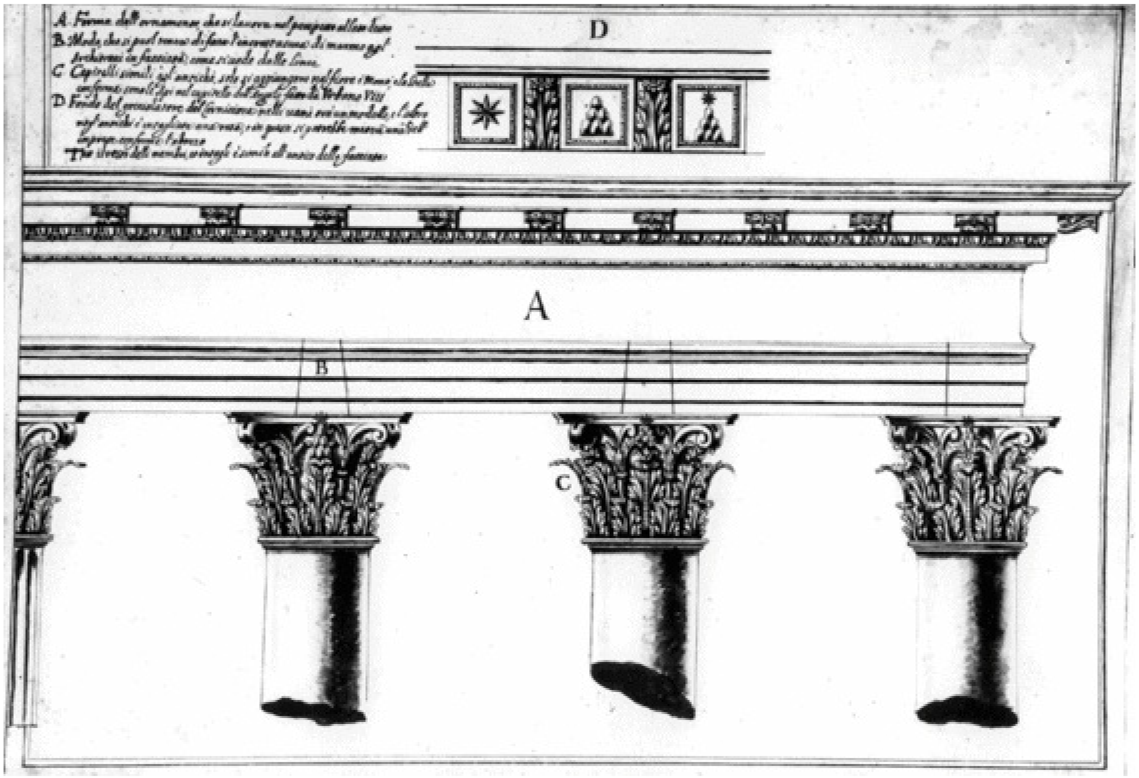
The explanation for this lack of congruence is clear from the drawing. The placement of the fountain responded more emphatically to the shape and dimensions of the piazza in 1575 than to the presence of the temple front. The columns of the portico were, after all, partially buried, and its pavement was some seven steps lower than the grade of the piazza at this time. In addition, before Urban VIII's repairs, the east bay of the portico was walled up and cut off from the piazza. The two essential components of the urban tissue – temple and piazza – lay thus side by side without intimate connection. In a sense, the piazza had been lifted away from the Pantheon, which became a powerful but not commanding border to the urban space. Things might have been different. Urban VIII had dreamed, as had Eugene IV in the fifteenth century, of isolating the Pantheon from the buildings

attached to it and clearing the piazza of the scourge of vendors, thus to unify the temple and the area that served as its forecourt in antiquity. But this was not to happen, not even partially, until the time of Alexander VII.[51]

Alexander's vision for Rome is legendary, the stuff of scholarly books and rafts of articles. His ambitions at the Pantheon were no less impressive than at other sites and, in some senses, even more grand, but they did not always come to fruition. In 1661, for example, we have evidence of his dream to knock down the block of houses between Piazza della Rotonda and Piazza Maddalena in order to enlarge the piazza/forecourt to its ancient dimensions. Like Urban, Alexander knew this to be the northern extent of the ancient piazza from reports of excavations made for the church of the Maddalena in the 1630s, when large sections of paving were found to match the paving dug up directly in front of the Pantheon. By 1662, however, the plan to unify the piazza was abandoned, probably because it was too expensive.[52] Nonetheless, Alexander did pursue the notion of grading the piazza to the ancient level.

This last project must have been tantalizing, but it too had to be scaled back. To bring the piazza down to its ancient level would have required reburying sewer lines; moreover, new sets of stairs would be necessary in front of every building around the piazza, and they would have intruded on the liberated space. Surrounding streets would have required stepped or ramped access points. For all of these reasons, the pope's ambitions had to be reconsidered. Instead, he ordered the existing piazza to be graded progressively from north to south, so that the bases of the columns on the venerable front would finally be cleared and the full height of the facade revealed. That work was begun in 1662 and terminated only in 1666. Early in the course of this campaign, Alexander had hoped to clear and widen the streets to either side of the Pantheon, effectively liberating the building in a manner related to the ambitions of Eugene IV and Urban VIII, as mentioned. At one moment during the planning process, the road on the east (left), connected to the church of S. Maria sopra Minerva, was to be flanked by porticoes (*logge*). The expense estimated for this operation, some 17,000 scudi, proved to be too great, however, and the enterprise was abandoned.[53]

Late in 1662, Alexander set plans in motion to restore the two missing columns on the east side of the portico. Replacement columns were found in pieces near the church of S. Luigi dei Francesi in 1662, but they were set in place only in 1667, using traditional techniques rather than the ancient procedure for piecing that was employed on other columns of the portico.[54] Operations for the restoration of the portico were carried out between February and April 1667, a month before Alexander's death. A drawing in the Chigi archives suggests that, initially, he envisioned restoring all three east-facing columns and refitting their capitals (Fig. 10.11). Even the corner capital (right in the drawing), with the Barberini bee, was to be replaced, perhaps in part to efface the distasteful recollection of Urban VIII's activities here. When the work was finished, the bee capital remained in place although the two new columns adjoining it and the new entablature do bear the emblems from the Chigi escutcheon.[55]



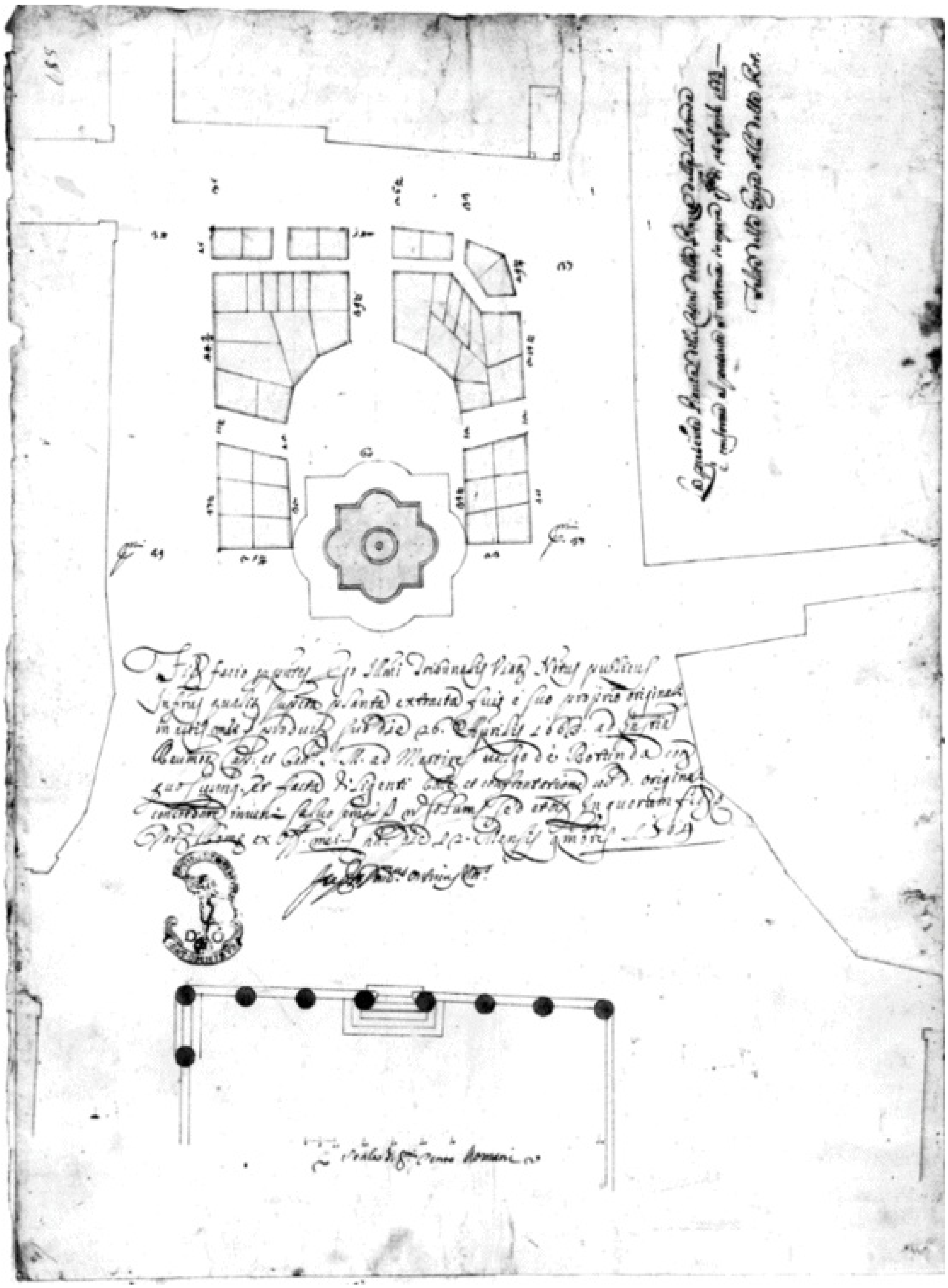
10.11. Study for the capitals and entablature to repair the east side of the Pantheon portico, with Chigi star and mounts; anonymous ink and wash drawing. (Biblioteca Apostolica Vaticana, Chigi P VII, 9, fol. 109 r)

Perhaps the most potent and intractable challenge to Alexander's efforts in restoring the Piazza della Rotonda related to its function as a market. Alexander's dealings with the vendors and with the Chapter of Santa Maria della Rotonda illustrate just how far a pope could or could not go to realize urban ambitions. The Chapter rented spaces in the portico and on the piazza to merchants, who in turn found the location exceptionally lucrative. How could Alexander dissuade the Chapter from exercising its perceived rights? How could he induce the vendors to ply their arts elsewhere? Alexander tried his best, but his efforts were destined to be thwarted. Here, in short order, is what occurred:

June 1656: vendor's table removed from the porphyry sarcophagus.
March 1657: vendors' booths confined by edict to travertine lines laid in the ground.
June 1657: papal orders for demolition of houses abutting the Pantheon.
January 1659; January 1661; June 1661: corresponding entries in Alexander's diary, the last of which says, "For the third time let's chase that flower seller from in front of the left column of the portico."
October 1659: Alexander considers issuing a commemorative medal depicting *la rotunda accomodata*.
July 1662: booths and stalls were demolished at Piazza della Rotonda.
January 1663: new facilities for the vendors built at nearby Piazza di Pietra were torn down.
February 1663: new stalls and booths were laid out on Piazza della Rotonda.
March 1663: the new accommodations at Piazza della Rotonda were complete.[56]

Because the vendors in the portico and on the piazza produced rents for the Chapter of Santa Maria

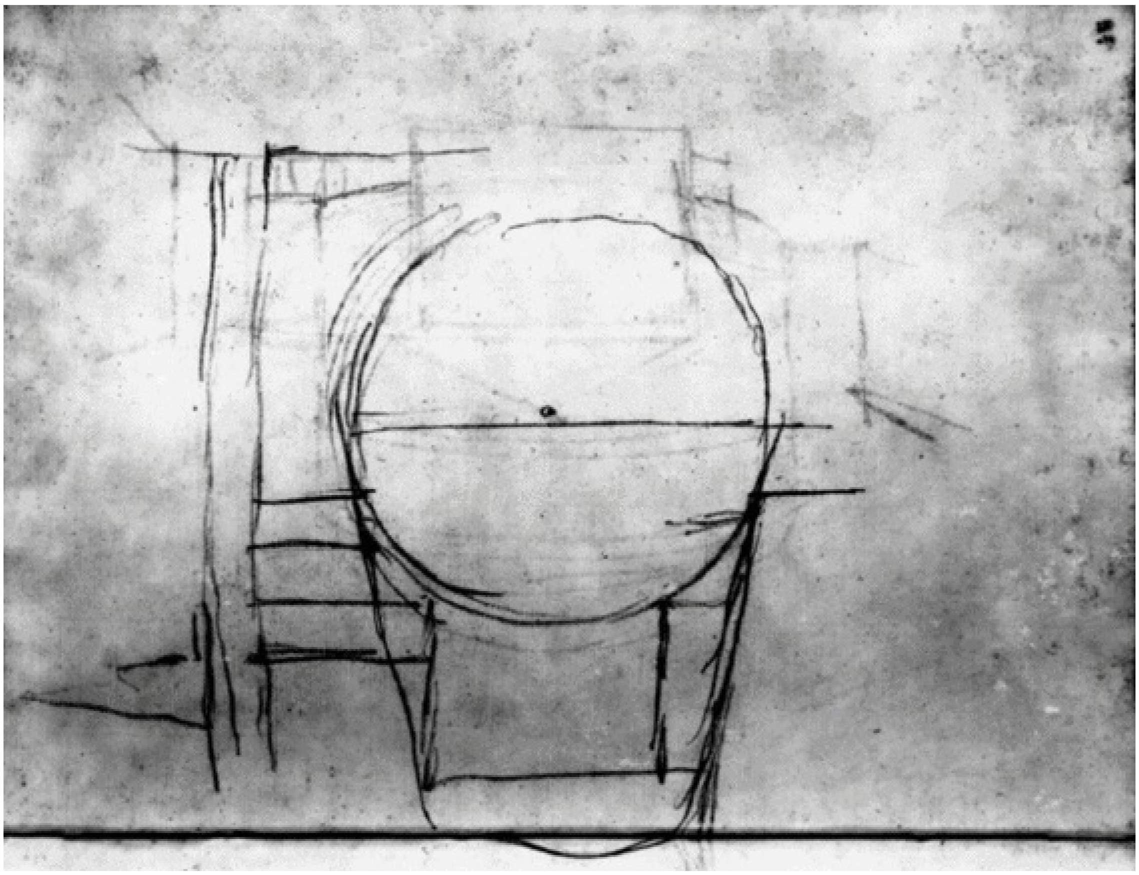
della Rotonda, the loss of this income became a point of contention. The idea of transferring the vendors en masse to the nearby Piazza di Pietra was mooted in 1662, but despite careful preparations to accommodate them there, they returned to Piazza della Rotonda by the end of the year.[57] Opposed by the persistence of fruit, vegetable, and spice sellers, fish-mongers, butchers, and bakers, as well as the Chapter, the pope retreated. He ordered the construction of new booths and stalls in orderly fashion behind the fountain, as we see in a plan of 1663 (Fig. 10.12. Steps down into the porch are still shown here, and so the piazza had not yet been graded.)[58]



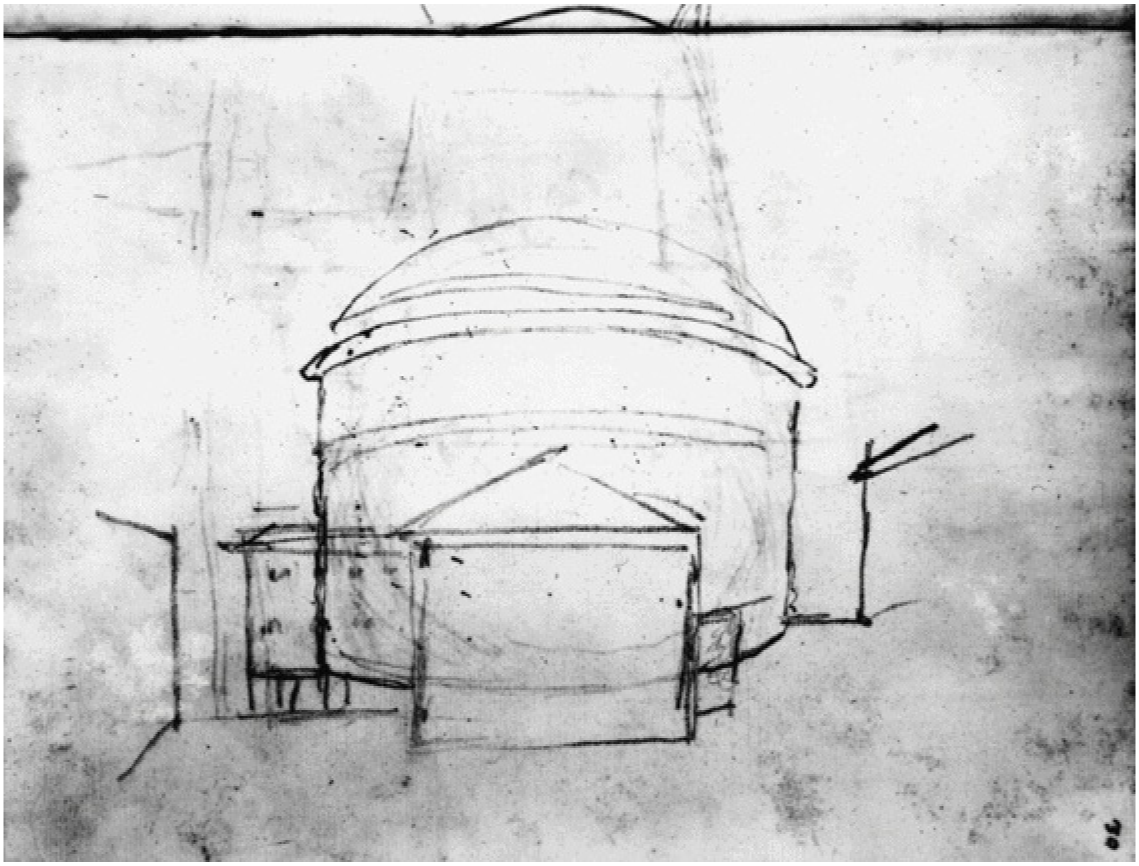
10.12. Plan of Piazza della Rotonda; drawing by Felice della Greca, 1663, with handwritten additions of 1704. (Biblioteca Apostolica Vaticana, Pantheon II.19, fasc. 3, fol. 688 r)

Yet another impediment to the liberation of the Pantheon from its urban context was the claim of

the Chapter of Santa Maria della Rotonda to adjoining properties it used to house its canonry. In a sketch plan by Bernini, we see the architect experimenting with a location for rebuilding the Chapter house on either side of the portico (Fig. 10.13). We can also see that diagonal sightlines on the sides of the portico take into account the location of the fountain, for the lines converge where the fountain (not depicted) was located. As we recall, Della Porta had located the fountain to the west of the Pantheon's principal axis, and this is why, despite the urge for regularity, Bernini feathered the lines on the west (right) side of the portico, as they oscillate between symmetry and reality, where the fountain is and where Bernini wanted it to be. The Chapter house was ultimately located on the east (left) side of the rotunda and behind the portico, as depicted in Bernini's elevation sketch of the site, an elevation that not incidentally does not include the twin bell towers so often misattributed to him (Fig. 10.14). The Chapter house was rebuilt here between 1663 and 1665.

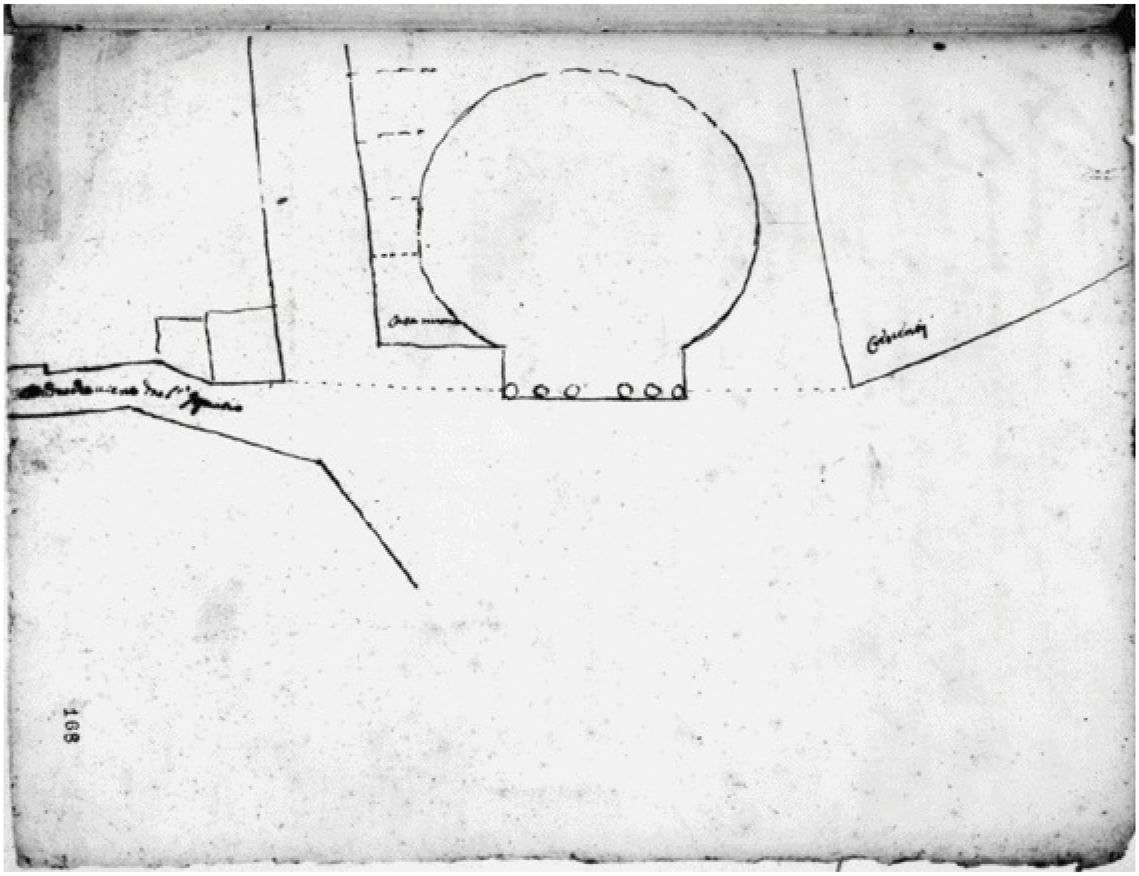


10.13. Sketch plan for the Pantheon and flanking streets; chalk drawing by Gianlorenzo Bernini, 1662 to early 1663. (Biblioteca Apostolica Vaticana, Chigi a.I.19, fol. 29 v)

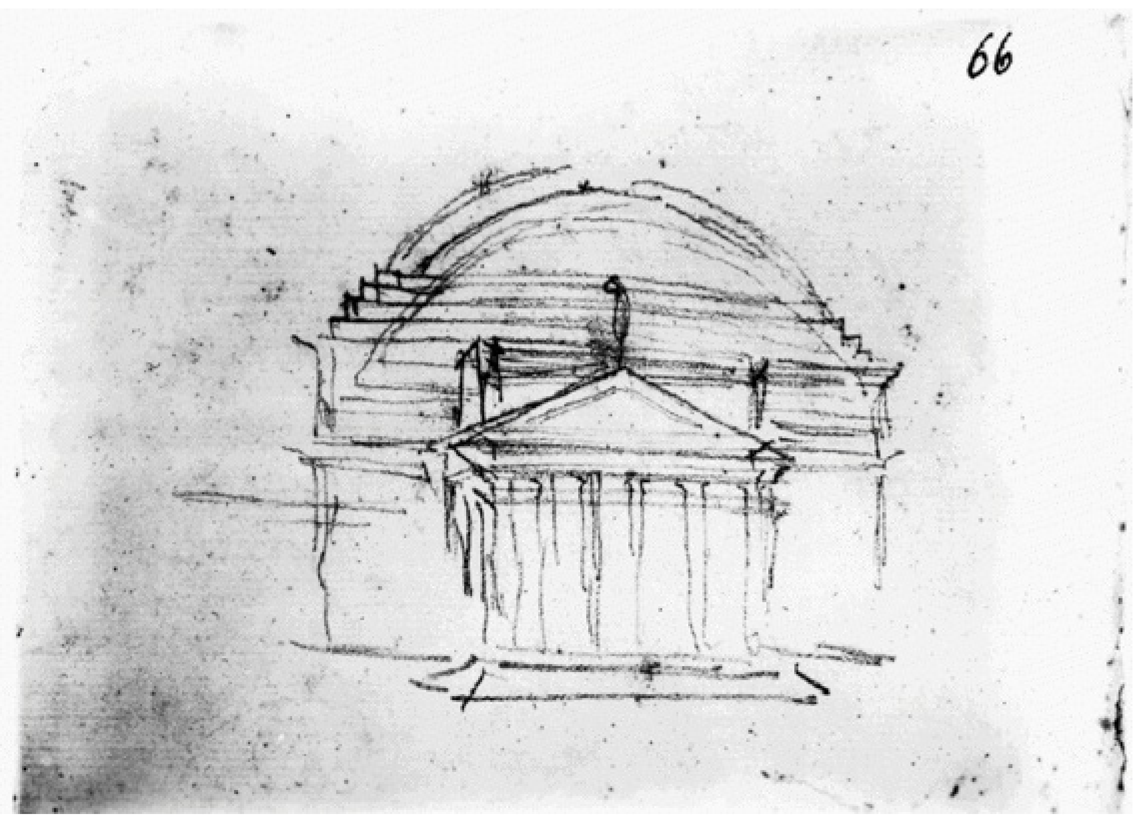


10.14. Elevation project for the facade and flanking blocks; chalk drawing by Gianlorenzo Bernini, 1662 to early 1663. (Biblioteca Apostolica Vaticana, Chigi a.I.19, fol. 30 r)

In recounting the antiquarian interests stimulated by the Pantheon in the seventeenth century, we need to mention a last pair of drawings that record the musings of Alexander VII, likely in the presence of his favorite architect, Bernini. A sketch plan of the building and its immediate urban context, drawn in a somewhat shaky, thoroughly economical style, can be attributed to the pope on the basis of his characteristic handwriting (Fig. 10.15).The plan is undated, but at this stage the attached buildings will have been stripped from the rotunda and the Chapter house is designated where it was actually built on the east side of the portico. Dotted lines across the front of the portico indicate a desire to adjust the opening of the flanking streets onto the piazza in a symmetrical manner. Most interesting of all, Alexander drew the portico as a hexastyle front, rather than the octastyle front that we know it was. Could he have been thinking about reducing the number of columns across the front, possibly inspired by the missing columns on the east? We cannot be sure. What is interesting is that the pope shared the idea with Bernini, who responded with one of the most lyrical architectural drawings of his career, a rapid, shimmering vision of the Pantheon (Fig. 10.16). His temple stands isolated in space and time, a simultaneous evocation of interior and exterior shapes stripped to their essences. The Chapter house is reduced to a single horizontal roofline, the pediment ornamented only by imagined statuary, and the facade reduced, like Alexander VII's, to a hexastyle front.



10.15. Hexastyle facade project in plan, with flanking streets; pen and ink drawing, hand of Alexander VII, 1662 to early 1663. (Biblioteca Apostolica Vaticana, Chigi M. VIII.60, fol. 168 r)



10.16. Hexastyle facade project; chalk drawing by Gianlorenzo Bernini, 1662 to early 1663. (Biblioteca Apostolica Vaticana, Chigi a.I.19, fol. 66 r)

What words were exchanged in this exercise of imagination and archaeology? What were these

men thinking? Might the image of Palladio’s hexastyle Tempietto at Maser, which was patterned after the Pantheon, have intruded on their thoughts, as it surely did in the contemporary design for Bernini’s church at Ariccia?[59] We may never know. Giovanni Battista Falda’s engraving of the site gives a good indication of what Alexander did achieve on the piazza: the terrain was graded smoothly from north to south, the stalls for vendors were reerected systematically behind the fountain, the columns of the portico were replaced, and a Chapter house was rebuilt behind the portico on the east side of the rotunda (Fig. 1.20).

The seventeenth-century history of the Pantheon is important because it reveals a good deal about antiquarian thinking at the time and because it helps to explain the way the monument and its urban context look today. Whereas the period 1400–1600 was critical for the study of the building, these centuries left relatively little that we find in today’s Pantheon. By contrast, as will be seen also in the following chapter, the seventeenth and eighteenth centuries left a record of many considerations and features that provoke fuller discussion of the Pantheon’s reception over time. Some of those projects and achievements gave form to concepts shared by popes in earlier times – Eugene IV, Nicholas V, and Innocent IX, for example – while others looked forward to works that were again mooted and occasionally carried out. There was the issue of the attic to grapple with, and so too the piazza. In the mid eighteenth century, Pope Benedict XIV (1740–1758) took in hand the definitive revision of the attic on the interior of the rotunda, hiring Paolo Posi to install the ornament that all visitors now see, its windows neatly aligned with the piers and the alcoves below them, and without any vertical elements that might interrupt a consistent vertical arrangement of decorative elements.

In 1733, Leone Pascoli proposed uniting Piazza della Rotonda and Piazza Maddalena, very much according to Alexander’s ambitions. The idea then came up a hundred years later under the administration of the Comte Camille De Tournon during the Napoleonic occupation in the first decade of the nineteenth century (see Fig. 1.21). Yet again, the first Master Plan of Rome of 1873, after the unification of Italy, reflected the full extension of the piazza envisioned during the Chigi pontificate. After the death of Victor Emanuel II, first king of united Italy, the architect Pietro Comparini projected a huge “Monumento Nazionale al Re Vittorio Emanuele II” at the Pantheon in 1881 (see Fig. 1.24). It was to be highlighted by an equestrian statue of the king, in some ways uniting the idea and imagery of the Campidoglio with the Pantheon, thus molding imperial, royal, and civic ambitions into a single enterprise. Because nothing was done, the Pantheon and Piazza della Rotonda continued to be a charged canvas on which successive leaders hoped to leave a mark. In the Fascist era Armando Brasini (1879–1965) designed a “Foro Mussolini,” also borrowing heavily from earlier schemes, including Comparini’s (see Fig. 1.25). The vision included a commemorative statue of Il Duce and a sunken plateau to be surrounded by famous ancient statues borrowed from Rome’s best museums. Against these very public imperial pretensions, Alexander VII’s plan to install his name and family emblems around the oculus of the dome seems almost timid. Above all, the works and ambitions of Urban VIII and Alexander VII may serve to demonstrate why any number of far-reaching plans was unlikely to succeed with so many stakeholders to satisfy and so many interests to serve. Moving forward in time, the wonder is that anything at all was realized from the broad corpus of projects, plans, and proposals.

1 Frank G. Moore, “The Gilt Bronze Tiles of the Pantheon,” *American Journal of Archaeology* 3,

1899, pp. 40–43.

2 David Karmon, *The Ruin of the Eternal City: Antiquity and Preservation in Renaissance Rome*, Oxford 2011, pp. 147–169, reviews the preservation history of the Pantheon with valuable bibliographic citations, including a reference to Sible De Blaauw, "Campane supra urbem," *Rivista di storia della chiesa in Italia* 47, 1993, pp. 367–414.

3 Karmon 2011, pp. 150 and 267, n. 23.

4 Karmon 2011, pp. 149 and 267, n. 22. The seven steps are mentioned in Ottavio Panciroli, *Tesori nascosti dell'alma città di Roma*, Rome 1625, p. 47.

5 Palazzo Venezia, Biblioteca di archeologia e storia dell'arte, Lanciani Collection, Roma XI, 22. I 19702.

6 Karmon (2011, pp. 155 and 268–269, nn. 40–44) cites useful Renaissance source materials and older documentary sources, such as Eugène Müntz, "Les monuments antiques de Rome au XVe siècle: Nicholas V, Pie II, Paul II, Sixte IV, et Alexandre VI," *Révue Archéologique* 2, no. 32, 1876, pp. 158–175.

7 Louise Rice, "Bernini and the Pantheon Bronze," in *Sankt Peter in Rom 1506–2006. Beiträge der internationalen Tagung vom 22–25 Februar 2006 in Bonn*, ed. Georg Satzinger and Sebastian Schütze, Munich 2008a, pp. 337–352; Rice, "Urbano VIII e il dilemma del portico del Pantheon," *Bollettino d'arte* 143, 2008b, pp. 93–110; Rice, "Pope Urban VIII and the Pantheon Portico," in *The Pantheon in Rome: Contributions to the Conference, Bern, November 9–12, 2006,* ed. Gerd Grasshoff, Michael Heinzelmann, and Markus Wäfler, Bern 2009, 155–156. I want to thank Louise Rice for making her material available to me from the beginning of her discoveries.

8 Rice 2008a, pp. 340–347.

9 Rice 2008a, pp. 350–351.

10 Heinrich Thelen, *Francesco Borromini: Die Handzeichnungen*, Graz, 1967, vol. 1, pp. 32–37, C25–29, for Borromini's work on the portico. Ian Campbell (*Ancient Topography and Architecture*, London 2004, p. 405) points out that some of the sixteenth-century beams are drawn incorrectly. My thanks to Carolyn Yerkes for bringing Campbell's observation to my attention. For the sixteenth-century drawings, now see Carolyn Y. Yerkes, "Drawings of the Pantheon in the Metropolitan Museum's Goldschmidt Scrapbook," *Metropolitan Museum Journal* 48, 2013, pp. 87–120.

11 Howard Hibbard, *Carlo Maderno and Roman Architecture 1580–1630*, London 1971, pp. 230–231. See now Giovanna Curcio, "Maderno-Borromini-Bernini: I due progetti per i campanili del Pantheon," *Quaderni dell' Istituto di storia dell'architettura* 60–62, 2013–2014, pp. 155–168.

12 Too many otherwise useful sources could be listed here. Instead, see Tod A. Marder, *Bernini and the Art of Architecture*, New York 1998, p. 225; Marder, "The Pantheon after Antiquity," in Grasshoff, Heinzelmann, and Wäfler 2009, p. 146; and Rice 2008a, 352, n. 57; she cites Borromini documents published by Oscar Pollak in 1928–1931, Heinrich Thelen in 1967, Marcello del Piazzo in 1968, Howard Hibbard in 1971, and M. Kahn-Rossi and M. Franciolli in 1999. Yet the attribution to Bernini, totally absent from the documents, lives on.

13 Rice 2008a, p. 337. Two lines of the tablet on the right have been altered.

14 Rice 2008a, pp. 337, 352. Anne-Christin Batzilla, "Bronzeniet vom Pantheon," in *Barock im Vatikan 1572–1676* (exh. cat. Bonn and Berlin), Leipzig 2005, p. 142, no. 54.

15 Rice 2008b ("Urbano VIII"), pp. 94–95; and Wilson Jones, this volume.

16 For this and the following paragraph, I again rely entirely on Rice 2008b, pp. 96–102, 106–110, with the original transcriptions.

17 Rice 2008b, p. 102.

18 Tilmann Buddensieg, "Das Pantheon in der Renaissance," *Kunstgeschichtliche Gesellschaft zu Berlin. Sitzungsberichte*, n. f. 13, 1964–1965, pp. 3–6; Buddensieg, "Criticism and Praise of the Pantheon in the Middle Ages and the Renaissance," *Classical Influences on European Culture AD 500–1500: Proceedings of an International Conference Held at Kings College, Cambridge, April 1969,* ed. R. R. Bolgar, Cambridge 1971, pp. 259–267; Buddensieg, "Criticism of Ancient Architecture in the Sixteenth and Seventeenth Centuries," *Classical Influences on European Culture AD 500–1500,* ed. R. R. Bolgar, Cambridge 1976, pp. 335–348.

19 Much of this discussion originates in my earlier studies; see Tod A. Marder, "Bernini and Alexander VII: Criticism and Praise of the Pantheon in the Seventeenth Century," *Art Bulletin* 71, no. 4, 1989, pp. 628–645; Marder 1998, pp. 225–237; Marder, "Symmetry and Eurythmy at the Pantheon: The Fate of Bernini's Perceptions from the Seventeenth Century to the Present Day," *Antiquity and Its Interpreters*, ed. Alina Payne, Ann Kuttner, and Rebekah Smick, New York 2000, pp. 217–226.

20 Corrado Maltese, ed., *Francesco di Giorgio. Trattati di architettura ingegneria e arte militare*,

vol. 1, Milan 1967, pp. 280–281, Plate 147; C. H. Ericsson, *Roman Architecture Expressed in Sketches by Francesco di Giorgio Martini*, Commentationes Humanarum Litterum 66, Helsinki 1980, pp. 219–220. See Chapter Nine in this volume for further comments on the drawing.

21 Sebastiano Serlio, *Il terzo libro dell'architettura,* Venice 1540.

22 Serlio 1619, Bk. III, 50r; Bk IV, 171r ff., in Vaughan Hart and Peter Hicks, *Sebastiano Serlio on Architecture*, 2 vols., New Haven 1996–2001; vol. 1, 1996.

23 Uffizi A 874 v, published with transcriptions in Alfonso Bartoli, *I monumenti antichi di Roma nei disegni degli Uffizi di Firenze*, 6 vols., Rome 1914–1922, vol. 3, Fig. 414; vol. 6, pp. 76–77. For other aspects of Sangallo the Younger's critique, see Chapter Nine.

24 Andrea Palladio, *I quattro libri dell'architettura*, Venice 1570.

25 "Per diametro della bellezza, e finezza di capitelli Michelangelo Buonarota si maraviglia anzi diceva, che dal primo Cornicione in giù era disegno angelico e non umano." The full passage was printed in Carlo Fea, *Miscellanea filologica critica e antiquaria,* 2 vols., Rome 1790 and 1836; vol. 2, p. 241, and referenced in Theodor Schreiber, "Über unedirte römische Fundberichte," *Berichte über die Verhandlungen der königlich sächsischen Gesellschaft der Wissenschaften zu Leipzig*, Philologisch-historische Classe 37, 1885, pp. 127–153 (reference kindly given me by the late Richard Krautheimer). See Chapter Nine, p. 289 here.

26 Giorgio Vasari, *Le vite de'più eccellenti pittroi scultori ed architetti*, vol. 4, ed. G. Milanesi, Florence 1906, pp. 511–512. See Marder 1989, p. 638, n. 39, and Chapter Nine, pp. 286–290, for Vasari's words.

27 Documentary references in Marder 1989, p. 638, n. 38.

28 Information kindness of Christy Anderson.

29 *Inigo Jones on Palladio: Being the Notes by Inigo Jones in the Copy of I Quattro libri dei architettura di Andrea Palladio, 1601, in the Library of Worcester College, Oxford*, ed. Bruce. Alsopp, Newcastle-upon-Tyne 1970, p. 57. Inigo dated his notes to "ye last of May 1614," but later added on the same page, "Noat that in ye year 1625 the bras travi of the portico wear taken of to cast into ordinance by Barbarini ye Pope and travi of timbre put in the steed. This Will. Smith painter of burnishit worke tould me for he was thear preasant." I owe the reference to the kindness of Christy Anderson. See Marder 2000.

30 Again, my thanks to Christy Anderson for originally bringing this notation to my attention.

31 Quoted in Marder 1989, pp. 634–635.

32 The letter was known to Stanislao Fraschetti, *Il Bernini*, Milan 1900, pp. 299–300, but never taken seriously. I argue for its importance in Marder 1989, with a transcription of the text.

33 I am not concerned here with the terms *simmetria* and *euritmia* that Bernini used to justify his reading (for which see Marder 2000, pp. 220–225), nor with the precise and measureable geometrical relationship of the main order to the pilastrini (for which see Ingrid D. Rowland and Thomas N. Howe, *Vitruvius: Ten Books on Architecture*, New York 1999, p. 147, Fig. 9).

34 See Mark Wilson Jones, *Principles of Roman Architecture*, New Haven 2000, pp. 114–116, and Fig. 6.14 for the Porta dei Borsari.

35 For illustration, see Wolfgang Lotz, *Architecture in Italy 1500–1600*, New Haven 1995, Fig. 150.

36 Sir John Soane's Museum, vol. 26. See Marder 2000.

37 Marder 2000, pp. 222–223, for references.

38 Famiano Nardini, *Roma antica*, Rome 1665, p. 335, is cited along with the others in Biblioteca Apostolica Vaticana (BAV), Chigi M VII, LX, fols. 139–141, and BAV, Pantheon I, 17, fol. 177ff. both of which are datable to Alexander VII's reign. See Marder 1989, p. 642, n. 53

39 Carlo Fontana, *Templum Vaticanum et ipsius origo. Cum aedificiis maxime cospiquis antiquitus & recens ibidem constitutes…*, Book 7, Rome 1694, pp. 454, 459–461, 467, and 473, cited in Marder 1989, pp. 640–641.

40 The avviso is given in Marder 1989, p. 630, n. 17.

41 Marder 1989.

42 Arnold Nesselrath, "Il Pantheon," *La Roma di Leon Battista Alberti. Umanisti, architetti e artisti alla scoperta dell'antico nella città del Quattrocento*, exhibition catalogue, ed. Francesco

Paolo Fiore in collaboration with Arnold Nesselrath, Milan 2005, pp. 190–198; Karmon2011, pp. 152–155.

43 Tod A. Marder, "Alexander VII, Bernini and the Urban Setting of the Pantheon in the Seventeent Century," *Journal of the Society of Architectural Historians* 50, 1991, pp. 273–292; p. 289.

44 John Patrick Donnelly, S.J., "To Close a Giant Eye: The Pantheon, 1591,"*Archivum Historiae Pontificiae* 24, 1986, pp. 377–384.

45 Tod A. Marder "Piazza della Rotonda e la Fontana del Pantheon: un rinnovamento urbanistico di Clemente XI," *Arte illustrate* 59, 1974, pp. 310–320.

46 For all drawings and documentation, see Marder 1989, pp. 629–634.

47 Carlo Fea, *Dei diritti del Principiato sugli antichi edifizi sacri e profane in occasione del Pantheon di Marco Agrippa*, Rome 1806, pp. 12, 39–40; Karmon 2011, p. 152.

48 Karmon 2011, p. 153.

49 Francesco Cerasoli, "I restauri del Pantheon dal secolo XV al XVIII,"*Bullettino della Commissione Archeologica Comunale di Roma* 37, 1909, p. 283.

50 Marder 1991, pp. 274–275; Marder 1974, pp. 310–320; and now the essays by Emma Marconcini in *La Fontana del Pantheon*, ed. Luisa Cardilli, Rome 1993, pp. 31–63, with still more documentation.

51 For Eugene IV, see Fea 1806a, pp. 12, 38–40; for Urban VIII, see Fea 1790 and1836, vol. 2, num. XVIII, p. 139; and for Alexander VII, see Marder 1991, pp. 274–276.

52 On the topic of Alexander VII and the mechanics of expropriation, see Maria Grazia Damelio "Gli espropri per la costruzione del colonnato di San Pietro a Roma,"*Città e storia* 1, 2004, pp. 159–167; and later Damelio, "Expropriation, Forced Sale, and Compensation: Legal Institutions anc Professional Practice in Rome during the Pontificate of Alexander VII Chigi (1655–1667)," i *Property Rights and Their Violators: Expropriations and Confiscations 16th–20th Century*, Bern 2012, pp.121–136.

53 Marder 1991, pp. 278–279.

54 See the fascinating article by Volker Hoffmann, “The Repaired Columns of the Pantheon,” in Grasshoff, Heinzelmann, and Wäfler 2009, pp. 195–199.

55 Marder 1991, p. 284; and now Nicoletta Marconi, *Edificando Roma Barocca. Macchine, apparati, maestranze e cantieri tra XVI e XVIII secolo*, Rome 2004, pp. 250–260, with precise descriptions of the methods used to install the columns. The architect for the work was Giuseppe Paglia, who came into conflict with Bernini here at the Pantheon and again at the completion of the Elephant and Obelisk monument in front of S. Maria sopra Minerva, and on many other occasions. See Tod A. Marder, “A Finger Bath in Rosewater: Cracks in Bernini’s Reputation,” in *Sankt Peter in Rom 1506–2006, Beiträge der internationalen Tagung vom 22–25 Februar 2006 in Bonn*, ed. Georg Satzinger and Sebastian Schütze, Munich 2008, pp. 427–434.

56 Marder 1991, pp. 276–283, with archival citations.

57 Details in Marder 1991, pp. 281–282.

58 Marder 1991, pp. 277–281.

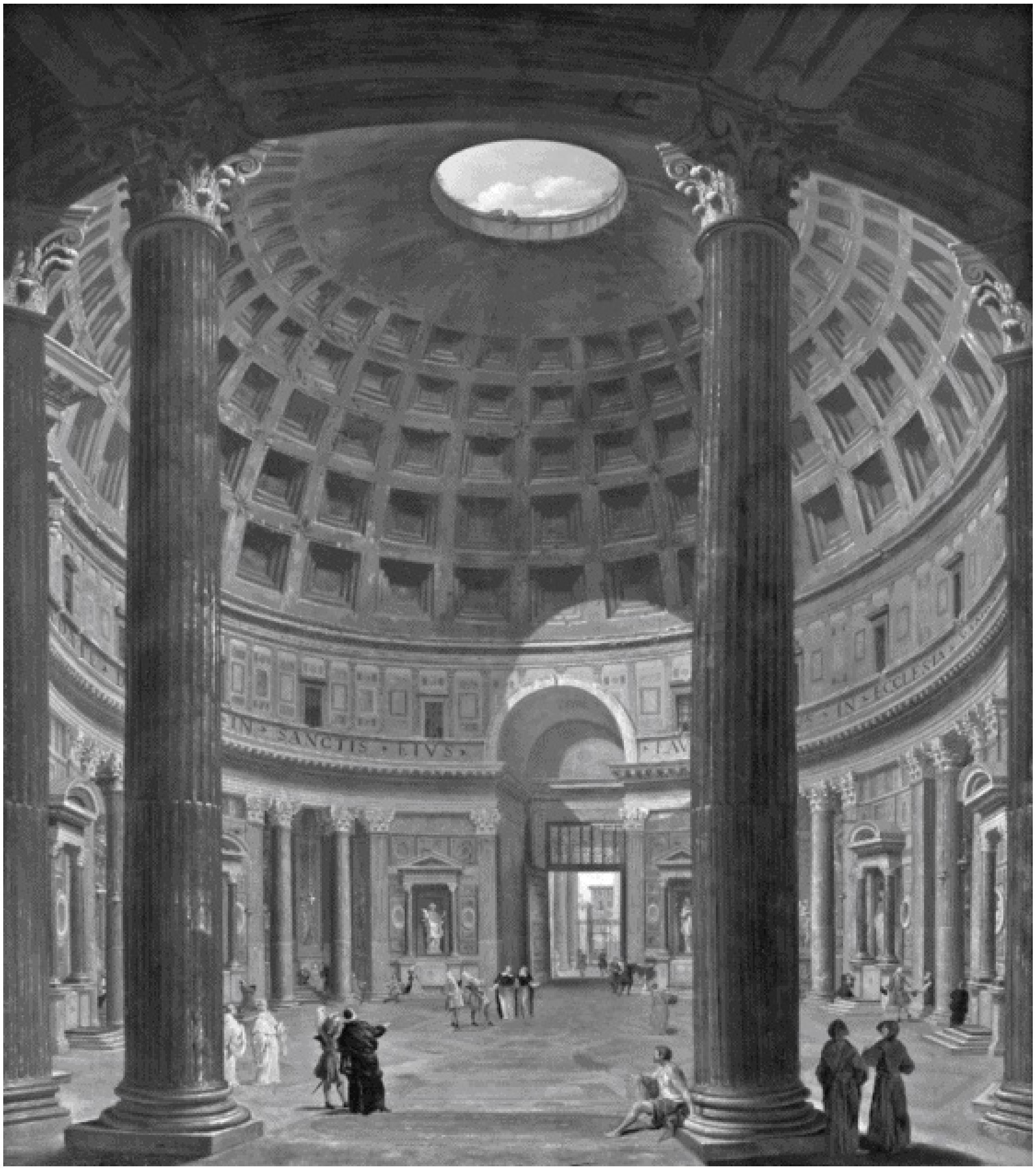
59 For the relationship of the church at Ariccia to the Pantheon, see my early publications, cited in Marder 1991, nn. 82 and 108, as well as Marder 1998, pp. 239–258. The then-owner of Palladio’s Villa and Tempietto at Maser, Pietro Basadonna, was the Venetian ambassador to the court of Alexander VII and a papal intimate.

Eleven Neoclassical Remodeling and Reconception, 1700–1820

Susanna Pasquali

The Pantheon Interior: A Famous View

The Pantheon in the eighteenth century is epitomized in a single image: the view of the interior of the monument painted by Gian Paolo Pannini (1691–1765) and replicated in many versions by him and his school (Fig. 11.1, Plate II). When it first appeared, this famous *veduta* ("view") was both a more reliable representation of the monument than those made previously and a celebration of a new veduta technique. For in addition to revealing a luminescent interior in radiant color, the magnificent interior seems also to have exploited the principles underlying the camera obscura, the instrument used to carry out a new method of view painting. Light bursts through the oculus into the dark interior – a sort of black box – and reflects on the coffered ceiling, thus allowing the viewer to observe every detail of the scene, which is shown with hitherto unknown clarity. It was this light that refreshed a view of an ancient monument that had been continuously portrayed for more than two centuries. Light revealed not only the exact arrangement of ancient marble columns and slabs but also their exact hues and all of the corrosion caused by the passing of centuries. Once they were transported home by tourists and erudites who had admired the monument in Rome, Pannini's canvases vividly called to mind the colors and traces of time past, thus complementing the bookish culture of their owners. In a century when personal response to masterpieces was highly valued and carefully theorized, this special rendering of light over battered marbles reawakened memories and emotions experienced on the site.



11.1. Interior of Pantheon; painting by Giovanni Paolo Pannini. (Copenhagen, Statens Museum for Kunst, inv. 4694)

When Pannini conceived this veduta, therefore, he had an audience of tourists and scholars in mind, a sort of Pantheon-appreciation society that would ensure the painting's immediate success. Indeed, from 1734 onward, he painted at least eight variations on this theme for famous and wealthy diplomats or Grand Tourists visiting the city.[1] These views, carefully conceived to meet a precise demand, reveal to us the various ways in which the multifaceted identity of the Pantheon was perceived during the eighteenth century. For although contemporary visitors to the Rotunda had different ideas about the building, they would have shared three overarching questions inherited from the antiquarians, artists, and church historians who had studied the Pantheon in the previous two centuries. Who built this ancient Roman building, and when? Could previous representations of the monument – potentially a model for modern architecture – be considered reliable? What was the significance of its changing use, from a temple to a Christian church, to the appearance of the fabric from the seventh century onward?

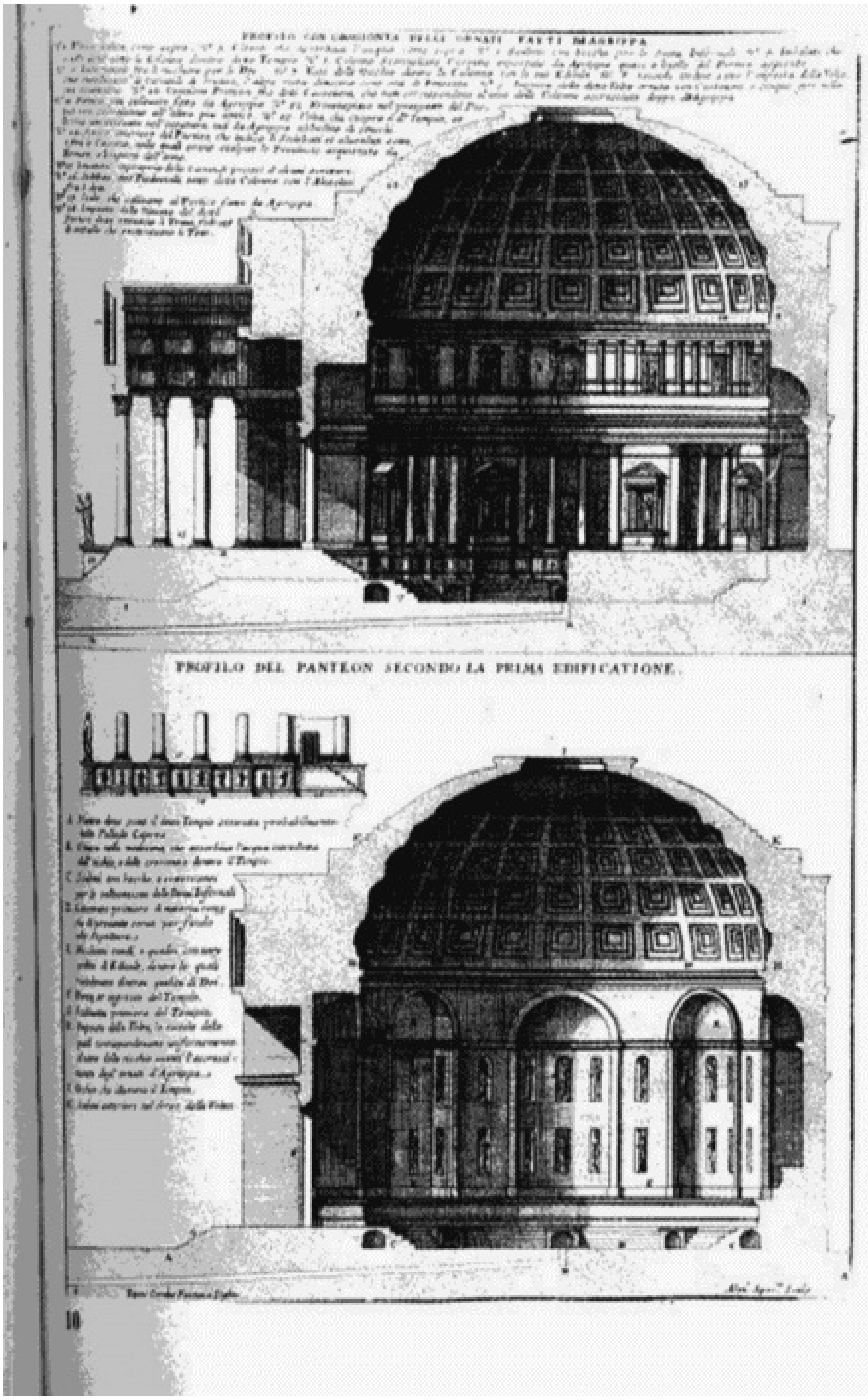
For Pannini and his contemporaries, the first two questions had received apparently definitive

attention in the form of two authoritative publications 50 years earlier. In 1682, the architect Antoine B. Desgodetz published a book entitled *Les édifices antiques de Rome* in Paris; 12 years later, in 1694, the architect Carlo Fontana issued his *Templum Vaticanum* in Rome. Throughout the eighteenth century, these two books – which differed considerably in their content, purpose, and target audience – represented the undisputed literary sources on the Pantheon. Desgodetz (1653–1728), a young protegé of the minister Colbert, was sent to Rome at the expense of the Académie Française in 1676–1677, charged with the task of carrying out a series of accurate measurements of Rome's ancient monuments. The Pantheon was obviously the most important among them. Having compared differing details in the illustrations of Roman monuments published by Sebastiano Serlio (1540), Andrea Palladio (1570), and Roland Fréart de Chambray (1650),[2] French academics wished to establish new and exact measurements. Upon Desgodetz's return to Paris, his measured drawings were discussed in the Académie's meetings and then lavishly published at the expense of the French crown, the text owing part of its authority to the fact that it was not the enterprise of an individual but of the leading French architectural institution.[3] Fontana (1638–1714), on the other hand, published his book at the apex of his career at the papal court. As architect of St. Peter's basilica, he dedicated a weighty tome to the church, rehearsing its long building history. An entire illustrated chapter of it was devoted to the Pantheon only because it was the largest known ancient temple; Fontana compared the Rotunda to St. Peter's in part to demonstrate that the latter boasted the greatest dome ever built in human history.[4]

Both Desgodetz and Fontana had correlated their firsthand observations of the Pantheon with the written sources on the monument, namely, the inscriptions present in the portico and information contained in classical literary sources. Because these sources had all been known since the Renaissance and were known to refer to the first Pantheon, which was built by Agrippa during the reign of Augustus, then destroyed by fire, and finally obliterated by the construction of the existing fabric, both authors reached conclusions virtually identical to those advanced by their predecessors, conclusions that were, unfortunately, incorrect. Observing the formal discontinuity of the rotunda and portico, and given that the latter bore a dedicatory inscription to Agrippa, both Desgodetz and Fontana maintained that the rotunda had been constructed earlier, during the Republican Age. Because they judged the bases of the columns of the internal order to be too low, they also concluded that Agrippa had raised the level of an earlier floor on the interior. Finally, again with regard to the interior, they noted that the second order in the attic was not clearly aligned with either the principal order below or with the ribs in the vault above and, furthermore, that the attic was awkwardly interrupted by the two arches of the entrance and main apse. Desgodetz and Fontana therefore concluded that the attic dated to a later period, perhaps the empire or even to the subsequent period coinciding with the first Christian use of the building. Thus, what we now assume to be a unitary building, constructed entirely in the second century, was still thought, as in the Renaissance, to be composed of discordant parts.

Desgodetz presented his observations in brief texts as commentary for his large-scale copperplate engravings, which illustrated the building with a degree of accuracy in measurement and detail hitherto unknown. Fontana's approach was different: rather than merely providing a series of comments on the existing building, he wrote the first illustrated history of the monument. Using a process of subtraction, he gradually removed from the existing Pantheon all of the elements that he believed to have been added over the years, ending up with the depiction of a hypothetical Republican Age temple, as distinguished from the one thought to have been built by Agrippa under Augustus. He visualized the former as a building without an external portico and without interior

columns, a temple whose archaic severity was based on the absence of all elements belonging to the architectural orders. The building that he proposed as Augustus's Pantheon resembled the existing edifice, with the addition of elements described in classical texts but presumed lost, replacing, for example, the much-discussed pilasters in the attic with the bronze caryatids described by Pliny. Accepting a possible location for the statues of the gods of the underworld between the heavens and the earth, as proposed in 1585,[5] he envisioned the floor at a much lower level than the one in the existing building (Fig. 11.2). As a result, none of Fontana's reconstructions of past Pantheons showed the controversial attic, thus reaffirming doubts about it.

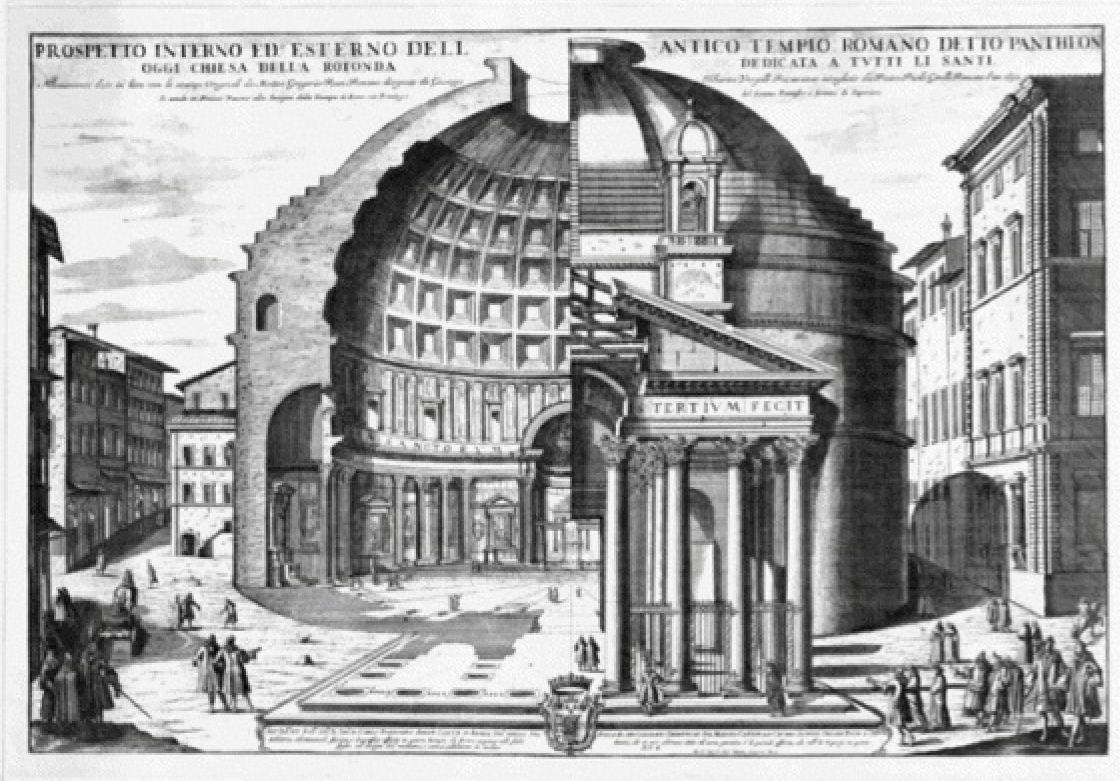


11.2. Cross section as reconstructed by Carlo Fontana depicting the Pantheon under Augustus, with caryatids in the left half, near the entrance (top), and reconstructed cross section depicting the Pantheon during the Republic (bottom). (Fontana 1694, Book 7)

The tourists represented in Pannini's views would have been familiar with such antiquarian

speculation. The painter portrayed them in the act of observing the interior of a building whose individual elements they had learned to date according to the theories of the day, while reserving their greatest admiration for those parts that they believed to have originated in the Augustan Age. Nevertheless, as other figures depicted by the painter in pious attitudes near the altars show, the Pantheon was also a church. It was an extremely ancient church, whose history as such belonged to a special category: Christian antiquity. Reliable documents as well as legends and miracles narrated in hagiographic literature on the Pantheon – better known at the time as the church of Santa Maria ad martyres – had been collected since the late sixteenth century, when the early history of Christianity gained special appeal. In this field of inquiry[6] – whose diffusion was limited to Roman Catholic countries – the salient event in the Pantheon's history was its consecration as a Christian temple. This much-admired ancient edifice had been saved from the destruction inflicted upon so many famous monuments thanks to the intervention of Pope Boniface IV, who had converted it into a church.[7] This event came to symbolize the survival of ancient Rome in the Christian era: after the fall of the empire, the papacy had imposed one religion that managed to ensure the city's preservation and avoid its complete ruin. Nowhere was this more evident than at the Pantheon.

The significance of the Pantheon as an ancient monument preserved through Christian reuse was to have an important effect in the evaluation of medieval and later transformations made in order to change the pagan temple into a church. Notwithstanding the emphasis that Christian antiquarians usually put on archaeological evidence, in the case of the Pantheon no descriptions or images of altars were written or drawn. Because the edifice had become the model of perfect conservation of ancient Rome through papal authority, there was no impetus to describe small-scale, yet important, transformations that presumably occurred during the intervening centuries. Like Raphael and all artists and architects who drew the interior of the Pantheon after him, Christian antiquarians also failed to include in their books any representation of such a prominent feature as the high altar, which was surmounted by a *ciborium* and a series of columns with an architrave forming a *pergula* separating the choir from the rest of the church. The only known image that includes these elements was issued for liturgical purposes, a curious engraving representing the church exactly as it was in the late seventeenth century (Fig. 11.3).[8]



11.3. Interior and exterior of Pantheon showing medieval high altar, its pergola, and other decorations in the apse; drawing by G. T. Vergelli, etched by P. P. Girelli. (Arrigoni and Bertarelli 1939, no. 2574).

Up to the First Cornice: Works Carried Out during the Papacy of Clement XI

By the early eighteenth century, and despite its venerable age, Santa Maria ad martyres was hardly considered an important church. After the eclipse of Pope Alexander VII Chigi's ambitious project for renewing the whole building under Fontana's direction,[9] the Pantheon as a religious site had but modest attractions. All of the altars were rather ordinary, except the two which were connected to Raphael's memory. In his will, the artist asked to be buried in one of the aedicules; in 1674, the painter Carlo Maratti (1625–1713) celebrated the artist's memory by placing a bust to either side – one depicting Raphael himself and the other Annibale Carracci.[10] In 1541, an altar standing in an adjacent exedra was assigned to the Confraternity of Saint Joseph of the Holy Land, a religious association accepting only artists and granting its members the opportunity of being buried in the church.[11]

The lack of any estimable work of art on these two important altars – indeed on any of the Pantheon's other altars – was due to the fact that the Rotunda was constantly under threat of flooding, an eventuality that discouraged any artistic endeavor in the church. In fact, because its floor still remained at a far lower level than the modern city, every time the Tiber burst its banks, the Pantheon would be one of the first buildings to be flooded. When the river rose past the level of the sewer outlets, the water would start running back up the pipes that normally channeled rain water down to the Tiber, to be released from the large drain cover in the center of the rotunda. In this way, the periodic and occasionally devastating floods had caused the dispersal of many of the slabs in the antique floor,[12] menaced all of the altars, and continuously deposited layers of slime on the antique

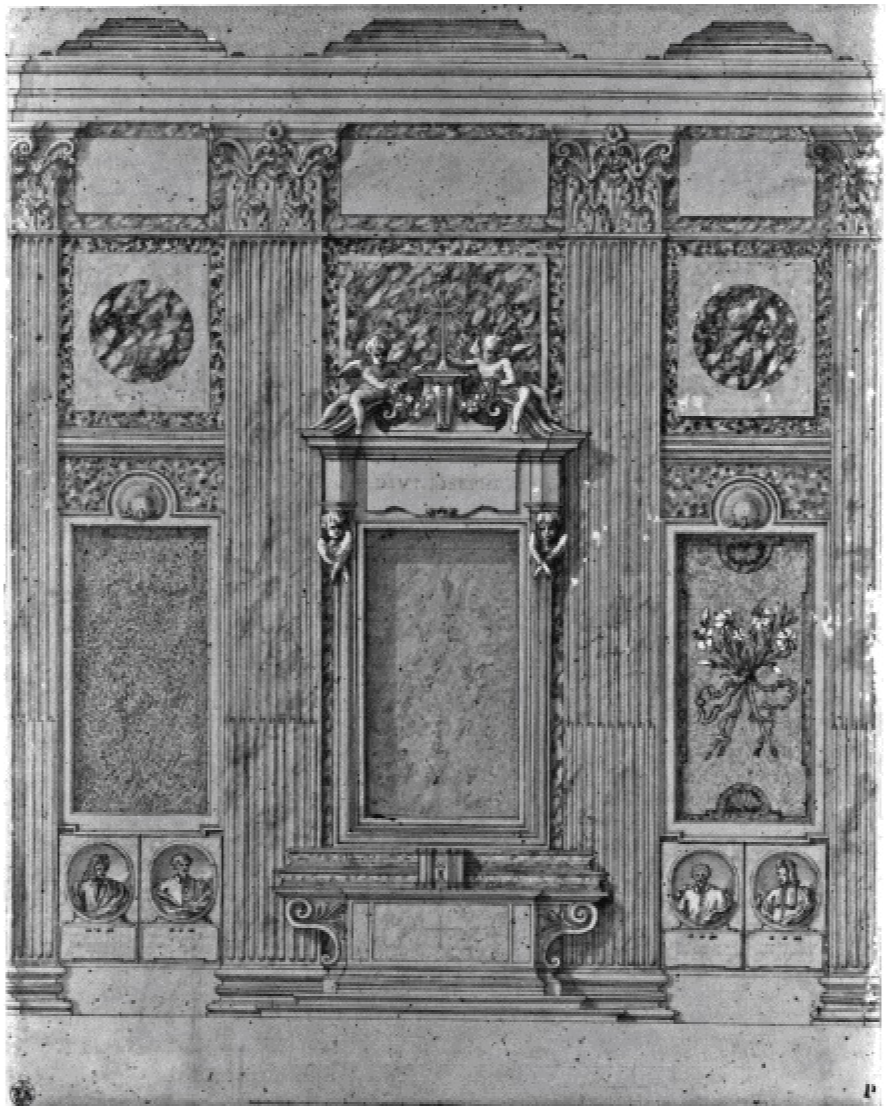
marble of the columns and paneling, particularly on the lower sections. A drainage system carried out in 1662–1667 proved only partially successful.[13]

It was not until the cleaning of a small area of one of the columns framing Raphael's tomb that the church was to experience a major change. A contemporary chronicle reports that in the spring of 1705, on the occasion of maintenance work on the altar carried out at the expense of Pope Clement XI Albani, a small area of one of the *giallo antico* columns was cleaned.[14] The gleaming surface that was thus revealed became an object of admiration on a par with an archaeological discovery: the same chronicle mentions that the pope himself, rushing to the church with a group of cardinals in order to admire the column, gave an order to extend the work to the entire inner circle of the rotunda, up to the first cornice. Accounts show that work started on the left and continued at a fair pace for a whole year, slowing down until 1711 when the renovation was concluded. The total cost of this project – organized mainly by the pope's brother, Orazio Albani, and Monsignor (later Cardinal) Niccolò del Giudice – was considerable.[15]

The generic term *pulitura* (cleaning) of marbles mentioned in the chronicles actually covered a whole range of activities. Francesco Bartoli, who as superintendent of antiquities was in charge of the conservation of Rome's ancient monuments,[16] drew up a list of work considered necessary and included precise instructions on how it was to be carried out, with the intention of preserving as much of the ancient monument as possible. From this precious document, we know exactly what was scheduled for the restoration of the interior of the rotunda. Apart from cleaning all of the porphyry and marble surfaces, to be done without the use of any acid, the damaged entablature and capitals were to undergo extensive repairs using stucco so as to avoid driving metal holding rods into the antique marble; reintegration of missing pieces in the marble veneer was also proposed, but without altering the original layout.[17] Unfortunately, Bartoli's instructions relative to reintegration seem to have been largely ignored. The original porphyry and marble slabs in the band immediately below the first entablature – as documented by Inigo Jones in 1614[18] and by Carlo Fontana's workshop in 1662–1667[19] – were in fact rearranged. Under the program of works promoted by Clement XI, all the porphyry slabs were replaced by the African marble slabs in situ today. Further extensive replacement work – recognizable by the different techniques used to anchor the pieces to the wall – was identified on the occasion of the restoration campaign carried out in 1992–1995.[20] As a result, much of the marble veneer up to the first entablature of the interior, which is generally held to be ancient and extraordinarily well preserved, has been revealed to be the fruit of this extensive program of works carried out less than 300 years ago.

Section by section, as the restoration of the interior progressed, the church, too, underwent a major transformation. Missing columns were replaced in the aedicules; all altar settings carried out on behalf of families or corporations during the previous centuries were removed; and the exedras, which had at the time already lost most of their original marble facings, were stripped of their remaining ornament and subjected to a new unified decorative scheme. The architect charged with carrying out the work was Alessandro Specchi (1668–1729), who had collaborated with Fontana on his *Templum Vaticanum* and was famous in his own right for having designed the new Porto di Ripetta (1703–1704). The general intent – as stated in the 1711 *Giornale de' Letterati d'Italia* – was to enhance both the much-admired antique architecture and its Christian reuse. The project would restore the Pantheon – described as a "corpse bared of all its ornaments" – to its earlier beauty; the church, stripped of any material memory discordant with the ancient building, would be endowed

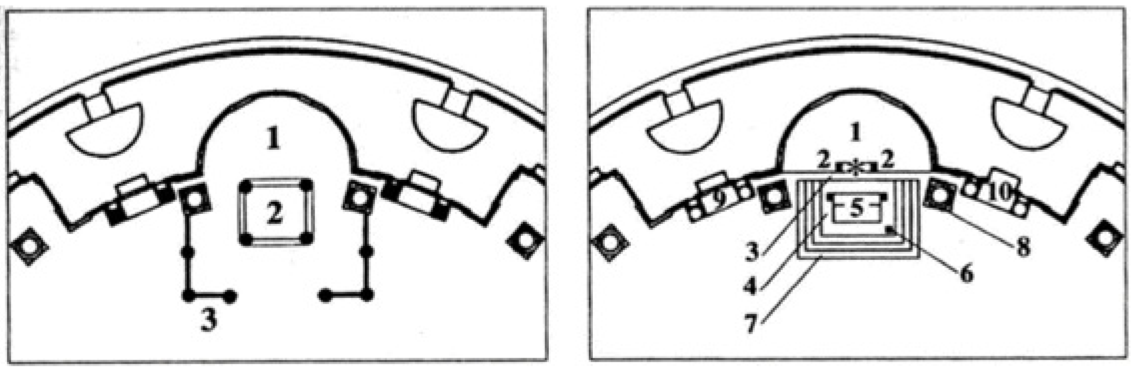
with renewed altars and chapels in harmony with the overall ancient scheme.[21] Specchi's drawings show that the altars and chapels were to be distinguished by simple forms, though richly decorated (Fig. 11.4);[22] but only a small part of these Baroque stucco garlands, scrolls, and putti – criticized by Commissioner Bartoli in 1705 as "ornaments of very hackneyed elements," would actually be realized.



11.4. Project for Chapel of S. Giuseppe di Terrasanta in the Pantheon; drawing attributed to Alessandro Specchi. (Berlin, Kupferstichkabinett, Italienische Zeichnungen, Kdz. 23821)

In the most important exedra, the one opposite the entrance, extraordinary care was needed. The demolition work in this area after 1711 had resulted in the destruction of the high altar, the ciborium above it, and the pergola. All were architectural features dating from the Middle Ages and renewed as late as the fifteenth century. They had been made of ancient marble slabs and columns taken from elsewhere in the building or from the Baths of Agrippa nearby (Fig. 11.3). Although this altar composition testified to the antiquity of Santa Maria ad martyres, in a renovated church where all of the marbles had been returned to their original positions, the use of *spolia* had come to be seen as historically inconsistent. Now, the removal of every trace of the church's postclassical past raised new questions: Should the altar be replaced? And what was to be put in its stead? An amateurish project, drawn up as a sketch plan with written notes, provides a possible solution (diagrammed in Fig. 11.5). The anonymous designer suggests occupying the empty exedra with the great porphyry urn that was a celebrated antiquity long associated with the Pantheon, documented as being located on the

exterior since the Renaissance, and traditionally believed to have been Agrippa's sarcophagus. Both the project[23] and a contemporary chronicle[24] reveal that the urn was proposed either as the base of the new main altar, for which it was to prove too high, or as part of a sculptural group depicting the Virgin at the moment of her assumption. These two rather different proposals would both have served the same purpose, placing within the exedra an ornament in keeping with the rest of the building, as well as recalling the Church's definitive victory over the pagan world by the conversion of the urn to Christian use. Employing the urn to hold the remains of the holy martyrs, as specified in the chronicle, would have repeated the theme of the ritual adopted 12 centuries earlier to convert the entire Pantheon into a church.[25]



11.5. On left: reconstruction of altar and related components predating the restorations of Clement XI (1700–1721), including the high altar and its *pergula* in the choir. (Scheme based on Biblioteca Apostolica Vaticana, Chigi P VII 9, f. 108). On right: the choir as described in an anonymous drawing of 1711, including choir and passage from the choir to the altar platform, a porphyry urn, a trench showing the original floor, the altar platform, an altar and altar step (*predella*), a bench for the clergy during solemn mass, and steps to the altar. (Based on Royal Library, Windsor Castle, Albani vol. n. 188, fol. 10636).

The works actually carried out differed somewhat from the schemes inspired by pious Christian antiquarianism. The urn remained at the portico of the Pantheon until 1732, when it was taken to S. Giovanni in Laterano to be used as the sarcophagus of Pope Clement XII. The choir of Santa Maria ad martyres was not refurbished until 1724 when, following the deaths of both Orazio Albani (1713) and his brother Pope Clement XI (1721), the project passed into the hands of Del Giudice, now a cardinal. Drawings by Specchi are related to this late period, and the work proceeded as designed with some significant variations. They show the apse decorated with a new mosaic, and in it a rather traditional altar dedicated to the Virgin, surmounted by a baldachin presumably intended to recall the older ciborium. A program intended to enhance the church's early Christian history was carried out only in the two aedicules to either side of the tribune, for these two altars were consecrated to Saints Erasius and Anastasius, whose relics had been rediscovered during the restoration project.[26] The decision to place a statue by the artists Bernardino Cametti and Francesco Moderati in each of the two aedicules was dictated by the intent to evoke elements from the ancient temple. The two aedicules were supplied with new column shafts made of giallo antico marble, finely fluted to resemble the two ancient columns to either side of the main exedra. Between them, the new statues were intended to replace those of the ancient gods.

Interior of the Dome and Attic: Work Carried Out during the Papacy of Benedict XIV

The grandiose scheme envisaged for the Pantheon by Pope Alexander VII (1655–1667) was the first in modern times to call for the renovation of its vault. Some of the plans drawn up by the architect Carlo Fontana for the occasion show new ornaments decorating the bare coffers, and the oculus was to be closed by a glazed lantern. Work on the ceiling, which started in a segment of the inner surface, or intrados, was interrupted immediately after the pope's death because, as the Senator of Rome stated, "the new ornaments deform the ancient monument instead of improving it."[27] The English architect James Gibbs (1682–1754), who had been a student of Fontana in Rome until 1708, mentions that the planned glazing of the oculus also met with similar resistance:

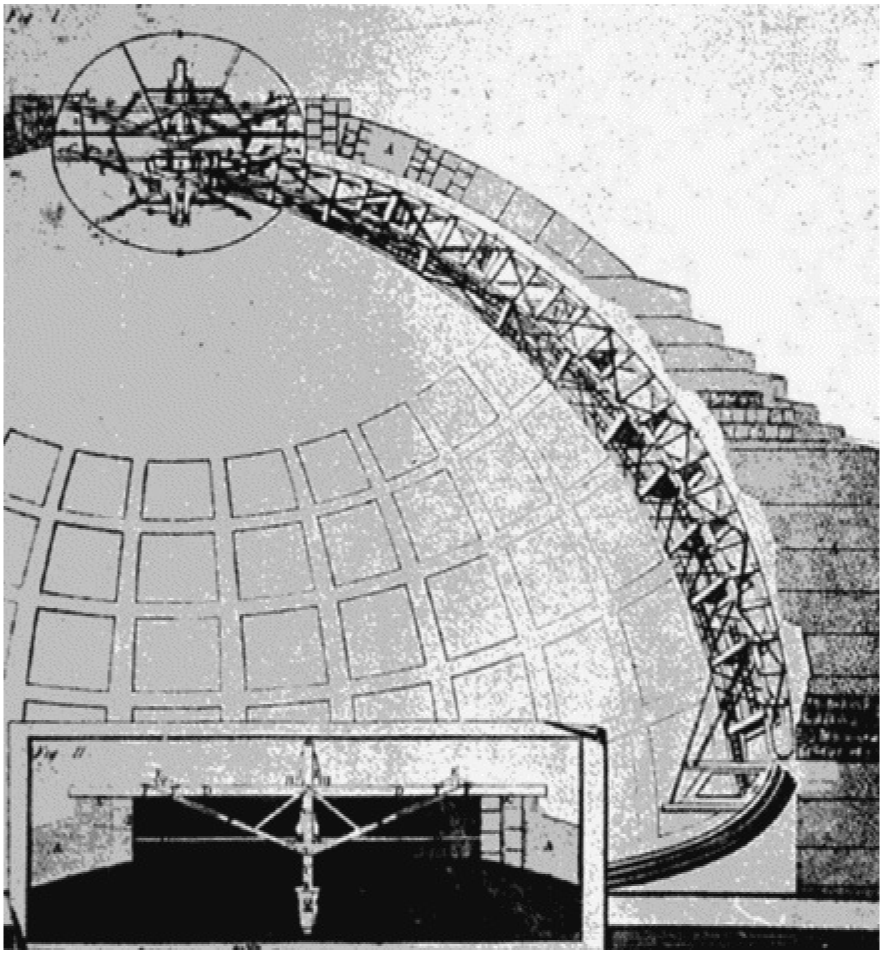
> There is another thing much wanted, and that is to put some sort of covering over the skylight, which would keep the rain and damps from discouloring the beautiful columns, linings of marble, and the fine paviment and likewise from rotting the pictures.... There can be no reason against it, unless it to be the folly of some whimsicall Antiquarys, who would finde fault with it, by saying, it would take away from the forme of its Antiquity, and make it looke too much like a modern building.[28]

With the resumption of work on the building, now according to the program envisaged by Clement XI, the issue was raised again. In 1711, a literary magazine, the *Giornale de' Letterati,* expressed the hope that with the marble cleaned, the pope would finally restore the dome to its "ancient splendour, obtained by adding some noble ornaments," comparable to the gilded bronzes described by the ancient sources. Yet once the level of the first entablature had been reached, work petered out. Count de Caylus, during his 1716 visit to Rome, entered the building and noted the great dome still "toute noire"; Charles De Brosses in 1737 found it to be "a heavy dome made of rough stones."[29] When restoration was finally resumed in the mid eighteenth century, it was unrelated to these grandiose projects, and was motivated instead by a chance event. In May 1753, a huge piece of lead fell down from the interior of the dome onto the pavement. The lead, which had originally served to anchor the decorations in the coffers, probably broke away from the ancient concrete surface because of dampness or age-related wear and tear. Its weight would have been sufficient to kill a visitor had the church not been empty at the time. Orders were given for repairs to be undertaken without further delay.[30]

In the absence of a major papal-sponsored project governing the restoration, the Pantheon lapsed into its usual condition: a building where many could claim rights, owing to the overlapping jurisdictions of the *ancien régime*. The ancient temple was under the jurisdiction of the Campidoglio, Rome's local government;[31] the operation of the church was the responsibility of the Canons of Santa Maria ad martyres; and some chapels, even after the overall reorganization under Clement XI, were still the property of confraternities. Nevertheless, after the incident of 1753, it was the exceptional scale of the project that determined who would be responsible for the urgent works needed. The representatives of the city government on the Campidoglio, whose right it was to carry them out, claimed to be incapable of even supplying an estimate of the expense involved. Only the Fabbrica di San Pietro that was overseeing the maintenance of St. Peter's basilica possessed the necessary

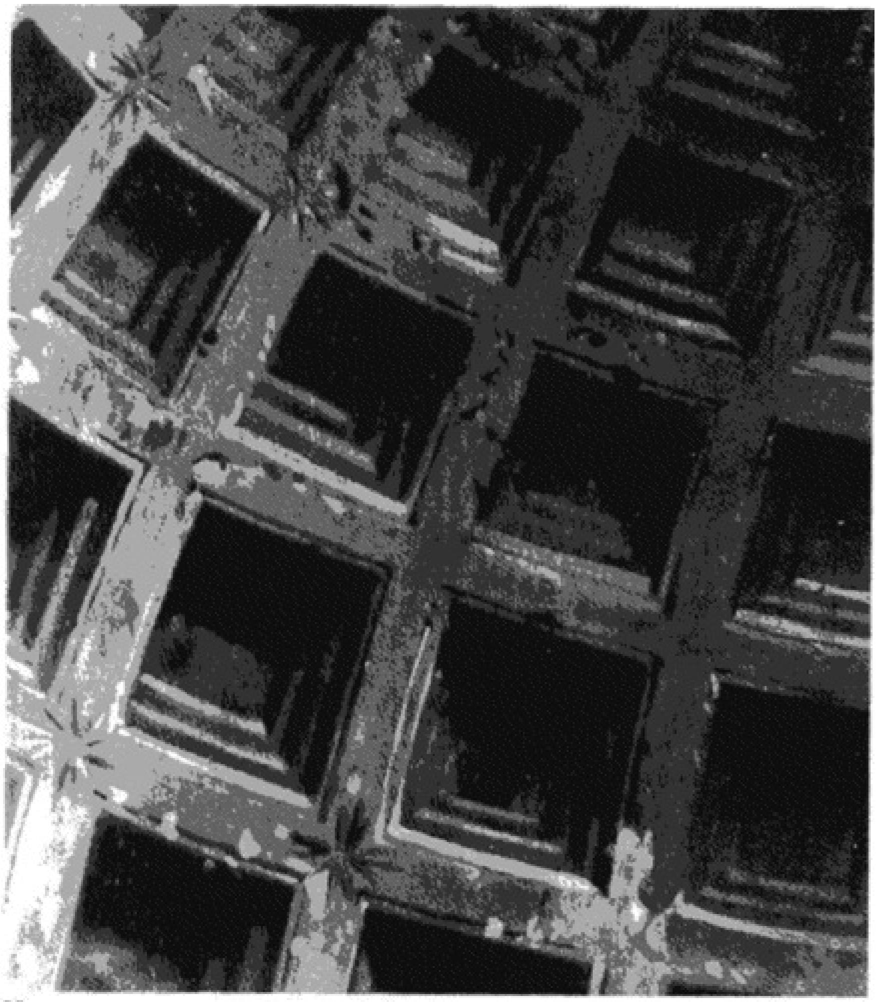
equipment – wooden scaffolding, ropes, and nails – and the technical skills required to restore the interior surface of the dome. In June 1755, the two leading master builders of the Fabbrica di San Pietro, Tommaso Albertini and Giovanni Corsini, signed an agreement to carry out the work requested for the sum of 600 scudi; in June of the following year, a second contract raised the figure to 1,670 scudi.[32] We can assume that jurisdictional disputes took place during the intervening period, for the Campidoglio protested that the works were carried out crudely. As a result, and as a comparison of the estimated expenses shows, methods were then changed. But in response to the criticism, Cardinal Gerolamo Colonna, who was in charge of paying for the works and running the Fabbrica di San Pietro, took advantage of the occasion to eliminate all outside interference. He assigned the jurisdiction of the entire building, first informally and then in a papal bull of February–March 1756, to his office alone.[33] From that moment on, the Pantheon was officially removed from the list of antiquities protected since the Middle Ages by the civic government of Rome, thus becoming a church like any other under the jurisdiction of the popes, at least as far as the administration of building works was concerned.

During this transition, which was to culminate with the exclusion of the superintendent of antiquities, Ridolfino Venuti, works were unexpectedly extended to include operations for which no estimates had been previously carried out. In the course of 1756, after the completion of repairs on the ceiling, executed by making use of a spectacular mobile scaffold fixed to the oculus (Fig. 11.6), the attic also underwent restoration. The first step probably involved an attempt to remove all marble veneer in order to fix the fragile pieces on bigger slabs before remounting them at their original place, a procedure successfully employed by Specchi a few decades earlier for the restoration of the lower walls of the rotunda. However, this approach failed, and most of the marble slabs of the attic, already badly damaged, crumbled irremediably when removed.[34] Thus, as it seemed too difficult to remount the original marbles, it was further decided to remove all of the ancient veneer. Little is known about what happened to these original marble and porphyry pieces. A last mention of them describes the pieces left in heaps in front of the portico ready to be taken away.[35] Only the most recognizable parts, such as the 64 capitals crowning the pilasters, left a more durable memory. By September 1779, most of them were documented in the property of someone in Rome, possibly a master mason. However, when the then–superintendent of antiquities, Giovan Battista Visconti, tried to secure them for the newly established Vatican Museums, they swiftly vanished in the meanders of the antiquarian market. They disappeared from Rome, only to reappear a few years later in prominent antique collections in London, Potsdam, and elsewhere in Europe.[36]



11.6. Mobile scaffolding invented and realized in 1756 by Tommaso Giovanni Corsini to restore the interior of the Pantheon dome. (Piranesi 1790, Figs. I–II of Plate XXIX)

Was the complete destruction of the attic a deliberate act or the result of a succession of improvident decisions? The contracts drawn up with the master builders specify that the final color of the repaired dome was to match the color of the only section already restored by order of Alexander VII (Fig. 11.7). Yet upon the completion of works in 1756, the ceiling had been rendered uniformly white with “two or three layers of whitewash” (*due o tre mani di calce*).[37] It is then possible that the new brightness of the whitened dome, paired with the gleaming marbles of the walls, as restored under Clement XI up to the first entablature, contrasted too starkly with the attic. Perhaps the desire to lessen the contrast led to the unexpected extension of the restoration program. In any case, Fontana’s documents showed that by 1666–1667, extensive areas of the original marble and porphyry were already missing, and that the sections replaced with painted stucco, as accurately documented in Pannini’s paintings in the eighteenth century, were already in a poor state.[38] Moreover, the attic was universally believed to date from well after the Augustan Age, when the existing Pantheon was supposed to have been built. An accurate restoration of this section of the rotunda may have been thought a waste of time and money, both by Cardinal Colonna, who was in charge of works, and by Antonio Baldani, a protégé of Cardinal Alesandro Albani who, as canon of the church of Santa Maria ad martyres, had assumed the unofficial role of antiquarian in guiding the enterprise.[39]



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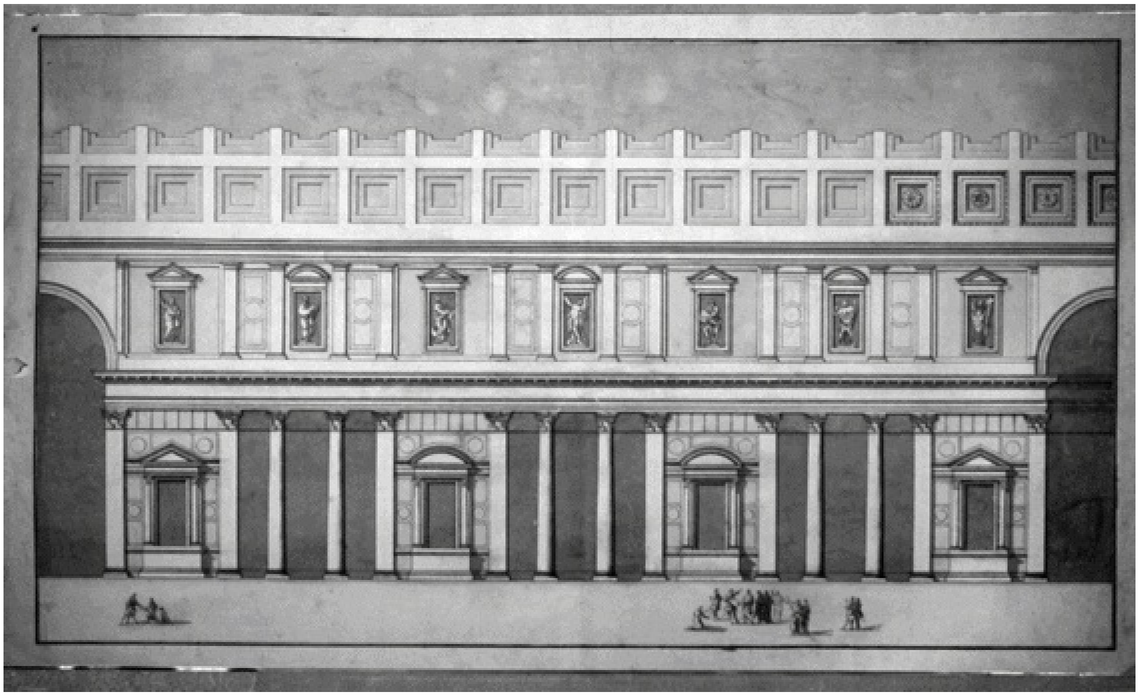
11.7. Detail of Figure 11.1 showing traces of decoration in the interior of the dome that were added by Carlo Fontana's workshop during the reign of Alexander VII, 1655–1667. (Copenhagen, Statens Museum for Kunst, inv. 4694)

The demolition of the attic revetment marked the beginning of a new phase of work. For the second time in a matter of decades, works undertaken in the interior of the Pantheon had created a void that needed to be filled, just as was the case when the old high altar was demolished. Moreover, while Clement XI's campaign had involved the replacement of the medieval ciborium that was thought to clash with the original antique setting, the detachment of the marble veneer again affected a part of the fabric as it had been universally known for centuries. In order to conceal the now-bare masonry cylinder between the first and second entablature, an effort would be made to coordinate all vertical alignments by creating a new architectural scheme. For this historic task the Vatican overseers proposed a rather ordinary solution: they summarily awarded responsibility for the design to the committee's chief architect, the Sienese Paolo Posi (1708–1776), who was mainly distinguished for his personal attachment to Cardinal Gerolamo Colonna.[40]

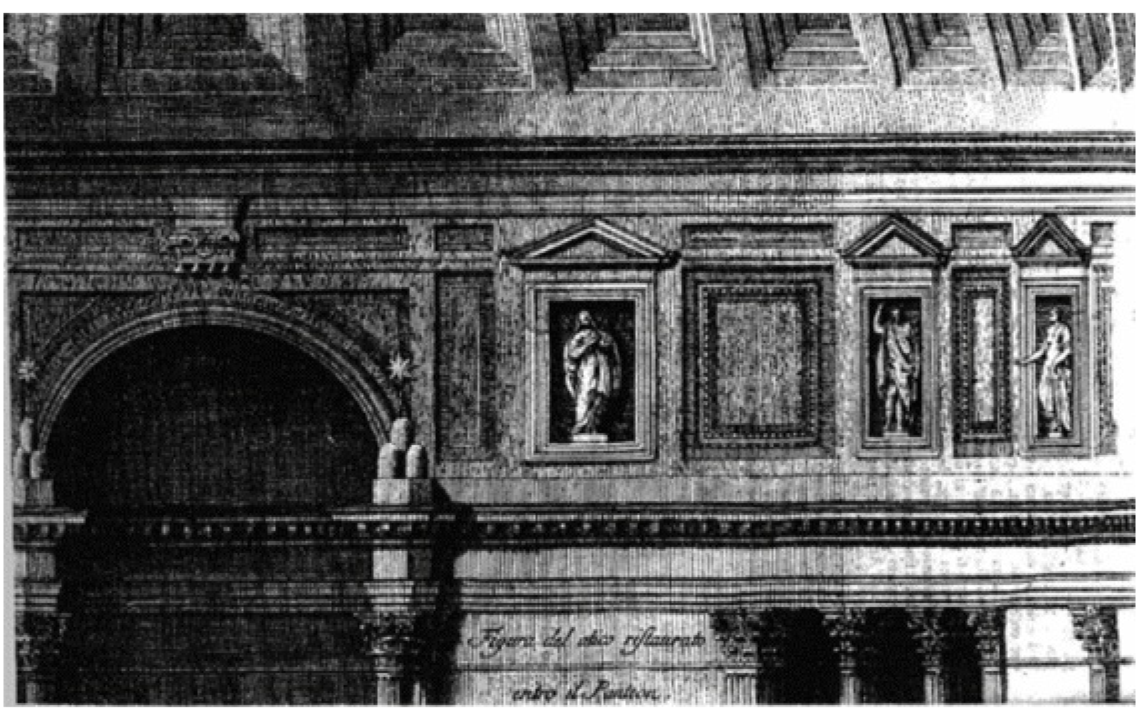
During the early months of 1757, Posi proposed various projects documented in two presentation drawings (one seen in Fig. 11.8)[41] and a medal struck for the occasion (Fig. 11.9).[42] All of the designs are distinguished by their reliance on the antiquarian tradition of the immediate past, consistent with Fontana's reconstructions of the Pantheon. The attic windows were transformed into niches housing statues, while their frames were surmounted by pediments. In the definitive design (Fig. 11.10),[43] the window frames were lengthened to create niches evoking the same features in the

aedicules below, at the expense of the ancient porphyry band above the first entablature. Their shape, far from being directly inspired by ancient examples, was simply drawn from Fontana's "Augustan Pantheon"(Fig. 11.2) and therefore reflect the proclivities of the late seventeenth century rather than an ancient model. Seventeenth-century tradition is also evident in one of the architect's proposed schemes (Fig. 11.9), where a richer ornamentation was presented, especially evident in the arch of the main exedra, which is surmounted by a huge cartouche held by two reclining figures.



11.8. Design proposal for Pantheon attic; drawing by Paolo Posi, ca. 1757. (Archivio di Stato di Torino, *Archivio Castelli Berroni*, cart. 5, fasc. 109)

11.9. Commemorative medal by O. Hamerani, officially represented in 1757, showing proposed attic design by Paolo Posi. (Biblioteca Apostolica Vaticana, Gabinetto numismatico)



11.10. Posi's attic design. (Represented in Visentini 1771, p. 20)

The design of the attic as finally realized is simpler than any of the projects initially proposed by Posi. Once he had determined the limited potential of a solution obtained by adding engaged columns corresponding to the columns and pilasters below (Fig. 11.8), he abandoned any further attempt at creating vertical alignments and restricted the ornament to squared panels. As a result, all of the parts long considered critical to the character of the composition, such as the intersection of the attic with the arches of the entrance and main exedra, were sacrificed to the decision to avoid difficulties rather than thoroughly resolve them in a manner reflecting the building as inherited. This strategy, possibly motivated by the need to curtail expenses or the duration of the work, was to have other consequences. The new attic was realized in painted stucco, even though Posi himself installed large amounts of fine marble veneer in the Museo Sacro in the Vatican for Cardinal Colonna during the same years. The statues that were to have been housed in the niches were replaced by less expensive *grisaille* paintings in trompe l'oeil, which soon deteriorated. Extant documentation suggests that the attic as seen today was the result of compromises in design resulting from the desire to create an architecture relying on the authority of Carlo Fontana's reconstruction but addressing the contradiction in formal logic so often noted in the attic register.

Criticisms Whispered in Rome and Proclaimed Abroad

Pope Benedict XIV fell seriously ill in the spring of 1756 and died two years later without having recovered his health. The accession of Clement XIII Rezzonico did not lead to any changes in the progress of the work, which remained under Posi and Cardinal Colonna's charge. In 1758, a proposal to glaze the oculus was rejected,[44] and all masonry work was completed. Finally, in 1759, repairs began on the large bronze doors that had collapsed while being taken down two years earlier, killing the unlucky master mason Corsini. Neither of the two popes paid an official visit to inspect the works, nor was any special ceremony organized to mark the reopening of the church for worship. There may have been little to celebrate. The events that had taken place, including the clumsy removal of the marble from the attic, the disastrous fall of the door, and the evident disregard for the fate of ancient stones (two huge granite slabs fixed on either side of the main entrance were removed only to become two tables in the Museo Sacro in the Vatican)[45] provoked criticism. Behind the rigid screen of censorship controlling the official Roman press, at least two libels were circulated. One accused the master masons of having undertaken work with the sole aim of taking possession of the ancient lead that still lined the coffers; the other directly attacked the work of the architect Posi.[46] Even the canons of Santa Maria ad martyres raised objections, but these were confined to their own recorded minutes. One of them reported that although Benedict XIV had on several occasions expressed the intent "to bring the church to perfection without removing its ancient parts," it was precisely "the ancient" that seemed to have been removed.[47]

Opinions of the connoisseurs who may have directly observed the outcome of the work are harder to detect. No public statements on the subject are known to have been made by the antiquarian Ridolfino Venuti, the superintendent excluded from surveying the works in the Pantheon. Nor did Johannes Joachim Winckelmann, living in Rome from November 1755 onward and a close associate of Antonio Baldani, the canon of S. Maria ad Martyres involved in the works, apparently write anything on the matter. Nonetheless, a letter, sent from Rome in February 1757 and published in *The Monthly Review* in London, gave voice to criticism that the strict censorship of papal government did

not allow to be expressed in Rome.[48] According to this letter, published anonymously, the restoration of the interior surface of the dome and the subsequent removal of ancient marbles from the attic were held to be part of a comprehensive plan to restore the church at the expense of the ancient temple. For the sake of the church, some of the ancient marble slabs of the floor were to be replaced, the oculus of the dome was to be covered by glass, and the dome itself was to be adorned with blue mosaics and rosettes in each of the coffers.[49] This plan was denounced as a public scandal and blamed on Posi, who was accused of the capital sin of "borrominism," that is, willful disregard of tradition.

Apart from this anonymous critic and the architect Vanvitelli writing to his brother[50] expressing minor reservations concerning Posi's design, the Pantheon's most attentive observer was the architect and antiquarian Giovanni Battista Piranesi (1720–1778). His interest in the restoration is attested by his possession by 1757 of the original drawings related to Corsini's innovative scaffolding.[51] It was probably while the work was still in progress that Piranesi, observing the dome and attic stripped of their revetment, first advanced his long-debated hypotheses concerning the arrangement of the building's inner structure (see Fig. 4.7). In addition to these speculations, he left precisely measured drawings of the demolished attic. It is also probable that, in 1757, he intended to write an entire book dedicated to the Pantheon, presenting all of the new evidence that had emerged during the renovation. But at a time when any treatise on the Pantheon ran the risk of being interpreted as contributing to the controversy surrounding the renovation, he preferred to set this project aside. His related drawings were to be published, deprived of any polemical text, long after his death by his son, who incorporated them in the plates of the *Seconda parte de' templij antichi* (1790).[52]

Compared to the building project promoted by Clement XI 40 years earlier, the works in 1756–1759 produced an uncomfortable compromise between the renovation of the Christian church and the ancient temple that it occupied. Such an unprecedented conflict between the needs of the Pantheon as a church and an ancient monument was to create a rift in public opinion outside of Rome.[53] Far from the papal court, all comments were radically negative. The Abbot of Saint-Non, when visiting Rome in 1759, barely recognized the ancient building:

> Yet what is most painful for those who have received from Nature some sentiment and taste is the bad idea recently proposed, to whiten the entire vault of this building; the stateliness that struck anyone who entered has disappeared; one no longer finds the mysterious, the beautiful, respectable tones that thousands of years had contributed to spread; now the building is no more than a large, round hall, a huge coffee-house amazing only for its shape and vastness.[54]

In particular, the destruction of the ancient attic shocked the illustrious cosmopolite Francesco Algarotti, who in August 1757 wrote: "What would Serlio, Palladio and Desgodetz say, after all the toil they endured to measure the parts of this classical edifice? What will Pannini say, he who so many times represented it?"[55]

Algarotti's rhetorical questions vividly evoke the general disdain for Posi's restoration. It is also worth noting that in his formulation, only Serlio, Palladio, and Desgodetz are cited as the leading authorities on ancient architecture, while during the late 1750s, outside of Roman circles where his renown as architect was still esteemed, Carlo Fontana's hypothesis on the Pantheon seems to have fallen out of favor. A most striking feature in Algarotti's text is the inclusion – with the same authority

as the authors of long-celebrated books on Roman antiquities – of a living painter like Gian Paolo Pannini. Calling upon his authority implies that his views of the interior of the Pantheon were widely trusted representations of that building. Pannini had added to the architecture, already presented in analytical detail by authors such as Palladio and Desgodetz, the color deposited by the passing of time on its marbles and ceiling, the very color that the most recent restorations had banished. After the destruction of the ancient attic, Pannini's paintings preserved the memory of what had disappeared, giving rise to a curious paradox: most of the criticisms expressed by visitors to the Pantheon in the second half of the eighteenth century were based not upon a comparison of the restored building with its previous appearance but on the building as depicted in the canvases of this painter. Even today, modern observers, admiring the representation of the Pantheon in Pannini's canvases, still mourn the loss of the attic of one of the few classical monuments to have otherwise survived in all its parts.

In view of these reactions, it is ironic that Pannini's interiors of the Pantheon are more than objects of nostalgia for what had been lost for, in truth, each of the versions shows elements that never existed while omitting elements that did exist. The two statues that he shows in the aedicules to either side of the entrance were never there, although in his time, two paintings did hang above their altars. Furthermore, the wall decorations and altars in the exedras represent Specchi's intentions, not reality. In at least two of the versions, the existing floor – whose documented losses of marble were never shown by Pannini in any of his canvases – is replaced by a more regular floor with a radial design (Fig. 11.1). Thus, Pannini's views did not accurately portray the scene in front of him, but rather as he would have liked it to be. In the Rotunda, either of his own choice or on the advice of a special patron, the painter included all of the elements added during Clement XII's refurbishing, as well as others that had only been planned. In accordance with what was believed to be the original ancient arrangement, for example, each of the aedicules was to have a statue, and the chapels in the exedrae were to be uniform in design. Moreover, none of Pannini's versions of the interior shows the renovated choir, probably because the painter refused to represent the new high altar surmounted by the baldachin, which he thought clashed with the architecture of the ancient temple. Consequently, his views of the Pantheon's interior illustrate something more and less than the coexistence of pagan temple and Christian church as it had evolved over the course of centuries. He pictured the monument not as it was but as it might have looked if it had been restored according to the project conceived but never fully executed by Clement XI.

With these realities in mind, Pannini's omission of Posi's executed work becomes even more striking. The refusal by both the painter and his public to cultivate or indulge an image of the Pantheon as restored gives evidence of a larger issue. Until the first decades of the eighteenth century, it was generally assumed that contemporary Roman architecture could rival the ancient monuments, yet by the second half of the same century, this was no longer the case. In the eyes of many artists and Grand Tourists in Rome, the failure of the restored Pantheon came to represent a broader crisis in contemporary Roman art.

Universal Pantheon versus S. Maria ad martyres

In one detail in particular, we can identify firm evidence in Pannini's views of the beginning of a new story that, just few decades later, was to give to the Pantheon a new function and influence. In all of his paintings of the interior of the rotunda, a pair of oval niches appear on the walls alongside each

aedicule, and almost all of them are represented as empty (Fig. 11.1). When the restoration of the lower part of the rotunda was completed, all of the tombs of the artists who, following Raphael's example, had chosen to be buried there were removed. Uniform niches were then commissioned by Cardinal Del Giudice in order to reinstall these funerary memorials and to renew interest in this practice. In 1713, Cardinal Ottoboni, protector of the Confraternity of Saint Joseph in the Holy Land was the first to place a bust unrelated to a tomb in one of these niches, to honor the memory of the musician Arcangelo Corelli.[56] Other busts were added in the following years.

Whether or not the empty niches testify to the difficulties of completing the program in the succeeding decades is unknown. Their later use was eventually encouraged in a completely different spirit, heralding a new role for the entire Pantheon. Around the 1780s, the Spanish diplomat Nicolas de Azára, the French art critic Jean-Baptiste Seroux D'Agincourt, and the German agent Johanne Friederich Raffenstein, all living then in Rome and in close contact with artists, each placed in the Pantheon a bust of his most famous countryman who had drawn inspiration from the city. The painters Anton Mengs and Nicolas Poussin and the art critic Johannes Joachim Winckelmann were thus honored. None of them was buried there, nor were they connected to the church of Santa Maria ad martyres or to any of its confraternities. These new busts – soon to be joined by a host of similar homages to better- and lesser-known painters, sculptors, architects, and literati – were instead associated with Raphael's tomb, and, as a group, they celebrated something more consequential than their individual nationalities, trumpeting Rome's importance as the artistic capital of the world. Although in existence for only a brief period – in 1820 the busts were transferred elsewhere[57] – the Pantheon of artists for a time seemed almost to supplant the significance of both the ancient and Christian heritage of the building, becoming the model for the many successive pantheons of Romanticism. The Temple des Grands Hommes in Paris, the Walhalla in Regensburg, and the tombs in S. Croce in Florence are but some of the examples of the Pantheon's universal legacy.

Translation of Chapter Eleven by Oona Smith; with thanks to Ann Giletti and Louise Rice for their help in revising the text. All issues presented here are extensively documented in Susanna Pasquali, *Il Pantheon: architettura e antiquaria nel Settecento a Roma*, Modena 1996; Pasquali, "From the Pantheon of Artists to the Pantheon of Illustrious Men: Raphael's Tomb and Its Legacy," in *Pantheon: Transformation of a Monumental Idea*, ed. Richard Wrigley and Matthew Craske, Aldershot 2004, pp. 35–56; Pasquali, "L'attico del Pantheon. Nuovi documenti sui marmi e sulla controversa ricostruzione del 1757," in *Bollettino d'arte* 85, 2008, pp. 111–122.

1 For the variations see Ferdinando Arisi, *Gian Paolo Panini e i fasti della Roma del '700*, Rome 1986; Michael Kiene, ed., *Pannini* (Exposition-dossier du département des Peintures, no. 41, Musée du Louvre, 15 October 1992–15 February 1993), exh. cat., Paris 1992. A comprehensive study of all Pannini's views of the interior of the Pantheon has yet to be done; the view once in Marble Hill House, Twickenham, is dated 1734.

2 S. Serlio, *Il terzo libro dell'architettura*, Venice 1540; A. Palladio, *I quattro libri*

dell'architettura, Venice 1570, Book IV; Roland Fréart de Chambray, *Parallèle de l'architecture antique et de la moderne*, Paris 1650.

3 Antoine B. Desgodetz, *Les édifices antiques de Rome dessinés et mesurés très exactement*, Paris 1682; on Desgodetz's book: Wolfgang Herrmann, "Antoine Desgodetz and the Académie Royale d'Architecture," *Art Bulletin* 40, 1958, pp. 23–53.

4 Carlo Fontana, *Templum Vaticanum et ipsius origo. Cum aedificiis maxime cospiquis antiquitus & recens ibidem constitutis* ..., Book 7, Rome 1694, pp. 454–474.

5 Ludovicus Demontiosus [L. de Montjosieu], *Romae Gallus Hospes, ubi multa antiquorum monimenta explicantur pars pristinae formae restituuntur* ..., Rome 1585; Fontana's debt to Demontiosus is discussed in Pasquali 1996a, pp. 12–14.

6 Simon Ditchfield, "Leggere e vedere Roma come icona culturale (1500–1800 circa)," in *Storia d'Italia. Annali* 16, 2000, pp. 33–73; pp. 33–55.

7 In eighteenth-century Rome, an entire book was dedicated to this topic: G. Marangoni, *Delle cose gentilesche e profane trasportate ad uso e a ornamento delle Chiese*, Rome 1744.

8 "Prospetto interno ed esterno dell'antico tempio romano," drawing by G. T. Vergelli, etching by P. P. Girelli, Rome 1692, with a second edition in 1773 (P. Arrigoni and A. Bertarelli, *Piante e vedute di Roma e del Lazio nella raccolta delle stampe e dei disegni Castello Sforzesco*, Milan 1939, no. 2574).

9 Richard Krautheimer, *The Rome of Alexander VII, 1655–1667*, Princeton 1985, pp. 104–109; Tod A. Marder, "Bernini and Alexander VII: Criticism and Praise of the Pantheon in the Seventeenth Century," *Art Bulletin* 71, no. 4, 1989, pp. 628–645; Marder, "Alexander VII: Bernini and the Urban Setting of the Pantheon in the Seventeenth Century," *Journal of the Society of Architectural Historians* 50, 1991, pp. 273–292.

10 Giovanni Pietro Bellori, *Vite di Guido Reni, Andrea Sacchi e Carlo Maratti*, ed. Marcello Piacentini, Rome 1942, p. 124. Raphael's bust was commissioned to the sculptor Pietro Paolo Naldini.

11 Pasquali 2004, pp. 35–38.

12 Missing slabs are carefully signaled as late as in 1813 (Ecole nationale supérieure des beaux-arts, *Restauration de 1813 par M. Leclère Architecte Pensionnaire du Roi à l'Académie de France à Rome*, Paris 1813, tav. XXI).

13 Works on the drainage system in Piazza della Rotonda were carried out by Padre Giuseppe Paglia.

14 Pasquali 1996a, pp. 141–142.

15 Pasquali 1996a, pp. 142–143 and p. 46, n. 10.

16 Ronald T. Ridley, "To Protect the Monuments: The Papal Antiquarian 1534–1870," in *Xenia antiqua* 1, 1992, pp. 117–154.

17 Pasquali 1996a, pp. 143–144.

18 *Inigo Jones on Palladio; Being the Notes by Inigo Jones in the Copy of I quattro libri dell'architettura di Andrea Palladio 1601 in the Library of Worcester College, Oxford*, ed. Bruce Allsopp, Newcastle upon Tyne 1970, pp. 81–82.

19 Biblioteca Apostolica Vaticana, Chigi P VII 9, cc. 111–113; for which see bibliography in n. 9 of this chapter.

20 Restoration work up to the first entablature was carried out by the soprintendenza of Rome, 1992–1995; information on techniques employed by Alessandro Specchi was kindly provided by Mario Lolli Ghetti, architect in charge at the time.

21 *Giornale de' Letterati d'Italia* (Rome) 7, 1711, pp. 447–456, speaks of the *cadavere nudo di tutti gli ornamenti* (Pasquali 1996a, p. 144).

22 Sabine, Jacob, ed., *Italienische Zeichnungen des Kunstbibliotheck Berlin. Architektur und Dekoration 16. bis 18. Jahrhundert*, Berlin 1975, p. 144; Tod A. Marder, "Specchi's High Altar for the Pantheon and the Statues by Cametti and Moderati," *Burlington Magazine* 122, 1980, pp. 30–40.

23 Royal Library, Windsor Castle, Albani Volumes, n. 188, f. 10636; Allan Braham and Hellmut Hager, *Carlo Fontana: The Drawings at Windsor Castle*, London 1971, n. 601; Pasquali 1996a, pp.

144–145.

24 Pasquali 1996a, pp. 42–44, n. 38.

25 Christian reuse of pagan temples was at the time a much debated topic. Rites of Christian consecration of ancient edifices and altars were carefully described in 1744 in Marangoni 1744; the Jesuit Lazeri, in order to deny the existence of such past practices, claimed that the ancient Pantheon had never been a temple but only a large bath hall (P. Lazeri, *Della consacrazione del Pantheon fatta da Bonifacio IV*, Rome 1749).

26 Marder 1980.

27 Krautheimer 1985, p. 185: "le nuove decorazioni deformano più che migliorano l'antico monumento"; C. Fea, *Annotazioni alla memoria sui diritti del Principato sugli edifizi pubblici sacri e profani*, Rome 1806, p. 114.

28 John Soane Museum, London, *James Gibbs Ms*, AL 39[A], p. 6.

29 Anne-Claude-Philippe Comte de Caylus, *Voyage d'Italie 1714–1715*, ed. A. A. Pons, Paris 1914, p. 184; Charles de Brosses, *Lettres d'Italie*, ed. F. D'Agay, Paris 1986, letter 39, p. 52.

30 Pasquali 1996a, pp. 144–150, 154–156; budget of works: pp. 150–153.

31 The local government, an elective body with a tradition going back to the Middle Ages, had special jurisdiction over the conservation of all ancient monuments in Rome; the privilege came from what was presumed to be a continuity of the modern government on the Capitoline Hill with the ancient Roman Senate.

32 Pasquali 1996a, pp. 150–153.

33 "Ad Summi Sacrorum Christianorum," February–March 1756, in *Benedicti Papae XIV Bullarium*, IX, Venetiis 1784; Pasquali 1996a, pp. 158–160.

34 Pasquali 1996a, p. 75, n. 43.

35 Pasquali 1996a, p. 75, n. 43.

36 A. Uncini, "Due capitelli dal Pantheon nella Collezione del Museo Gregoriano Profano ex Lateranense," in *Bollettino dei monumenti musei e gallerie pontificie* 8, 1988, pp. 55–63.

37 Evidence of the works begun on the vault by Pope Alexander VII is visible in one of Pannini's canvases (Copenhagen, Staten Museum for Kunst, inv. n. 4694; Pasquali, Fig. 33). Whitewash is documented in Pasquali 1996a, pp. 73–75.

38 Pasquali 1996a, p. 78, n. 10.

39 Pasquali 1996a, pp. 92–101.

40 Bruno Contardi and Giovanna Curcio, eds., *In urbe architectus. Modelli, disegni, misure. La professione dell'architetto a Roma 1680–1750*, Rome 1991, pp. 422–424.

41 Only one of Posi's original drawings is known (Archivio di Stato Torino, *Archivio Cestelli Bessoni*, cart. 5, fasc. 109); another project by a pupil, Giuseppe Piermarini, may be a copy of a lost original or a personal interpretation of the theme (M. Tabarrini, "Catalogo del fondo piermariniano di Foligno," no. 1.3, p. 66, in *Giuseppe Piermarini. I disegni di Foligno. Il volto piermariniano della Scala*, exh. cat., Milan 1998). Both differ from the project as realized.

42 Franco Bartolotti, *La medaglia annuale dei romani pontefici da Paolo V a Paolo VI, 1605–1967*, Rimini 1967, p. 174.

43 Posi's final project was first published (and censured) in A. Visentini, *Osservazioni di Antonio Visentini Architetto veneto, che servono di continuazione al trattato di Teofilo Gallaccini*, Venice 1771, pp. 16–23; an alternative design is proposed on p. 22.

44 From surviving descriptions, the proposed glazing was made of an iron frame and glass (Pasquali 1996a, p. 45).

45 The gratuitous removal of the two large granite slabs from their original position is first documented by Piranesi (in G. B. Piranesi, *Vedute di Roma*, Roma n.d.: "Veduta interna del pronao del Pantheon," letter D). About the monumental tables (more than 3 meters long), now in Biblioteca Apostolica Vaticana, see Chiara Felicetti, ed., *Cristoforo Unterperger. Un pittore fiemmese nell'Europa del Settecento*, exh. cat., Rome 1998, pp. 64–68.

46 When in Rome, the Abbot of Saint-Non heard rumors about the presumed interest of the contractors of the works (Pierre Rosenberg, ed., *Saint-Non, Fragonard. Panopticon italiano. Un diario di viaggio ritrovato 1759–1761*, Paris 1986, pp. 134–135). In May 1757, the architect Luigi Vanvitelli commented in a private letter on a defamatory libel written against Posi (Luigi Vanvitelli, *Le lettere di Luigi Vanvitelli della Biblioteca Palatina di Caserta,* Galatina, 1976, n. 465, May 15, 1757).

47 Pasquali 1996a, p. 77.

48 Pasquali 2008.

49 Pasquali 2008.

50 Vanvitelli 1976, no. 454, March 29, 1757.

51 In 1757, Piranesi had Corsini's drawings in his hands (Pasquali 1996a, p. 72, n. 33); later, they were published by his son (Francesco Piranesi, *Seconda parte de' templij antichi che contiene il celebre Pantheon* ..., Rome 1790, Plate XXIX).

52 An anonymous drawing proposing a different attic was recently attributed to Piranesi (Elisabeth Kieven, ed., *Von Bernini bis Piranesi. Römische Architekturzeichnungen des Barock*, exh. cat., Stuttgart 1993, no. 134) and connected to Posi's work (Lola Kantor Kazovsky, "Pierre Jean Mariette and Piranesi: The Controversy Reconsidered," in *The Serpent and the Stylus: Essays on G. B. Piranesi*, ed. M. Bevilacqua, H. Hyde Minor, and F. Barry, Ann Arbor 2006, pp. 149–168). No documents have since emerged, and during the 1750s, a Piranesi's involvement as architect of the Pantheon seems highly improbable.

53 In his correspondence, Vanvitelli had occasion to criticize Posi's project, regarding it as an undertaking of modern architecture that he did not like (Vanvitelli 1757, no. 454, March 29, 1757). He did not, however, protest against the destruction of the attic.

54 *Mais ce qui fait le plus de peine à ceux qui ont reçû de la Nature un peu de sentiment et un peu de goût, c'est la mauvaise idée que l'on a eu en dernier lieu de blanchir toute la voûte intérieure de cet édifice; ce majestueux dont ont étoit frapé [sic] en y entrant est évanoüi, l'on n'y retrouve plus ce mistérieux, ces beaux tons respectables que les milliers d'années y avoient repandus; ce n'est plus, enfin, qu'un grande salle ronde, un grand café qui n'a rien d'étonnant que sa forme et sa grandeur* (Rosenberg 1986, pp. 134–135).

55 *Che direbbe il Serlio, il Palladio, il Desgodetz, che hanno durato tanta fatica a misurare i membri di quel classico edifizio? Che dirà il Pannini che lo ha tante volte ricopiato nell'antica sua forma?* (Giovanni Gaetano Bottari and Stefano Ticozzi, eds.,*Raccolta di lettere sulla pittura, scultura e architettura*, vol. 7, Milan 1822, pp. 405–408; the letter, here dated 1756, was in fact written in 1757).

56 Pasquali 2004, pp. 38–43.

57 Pasquali 2004, pp. 43–49.

Twelve A Nineteenth-Century Monument for the State

Robin B. Williams

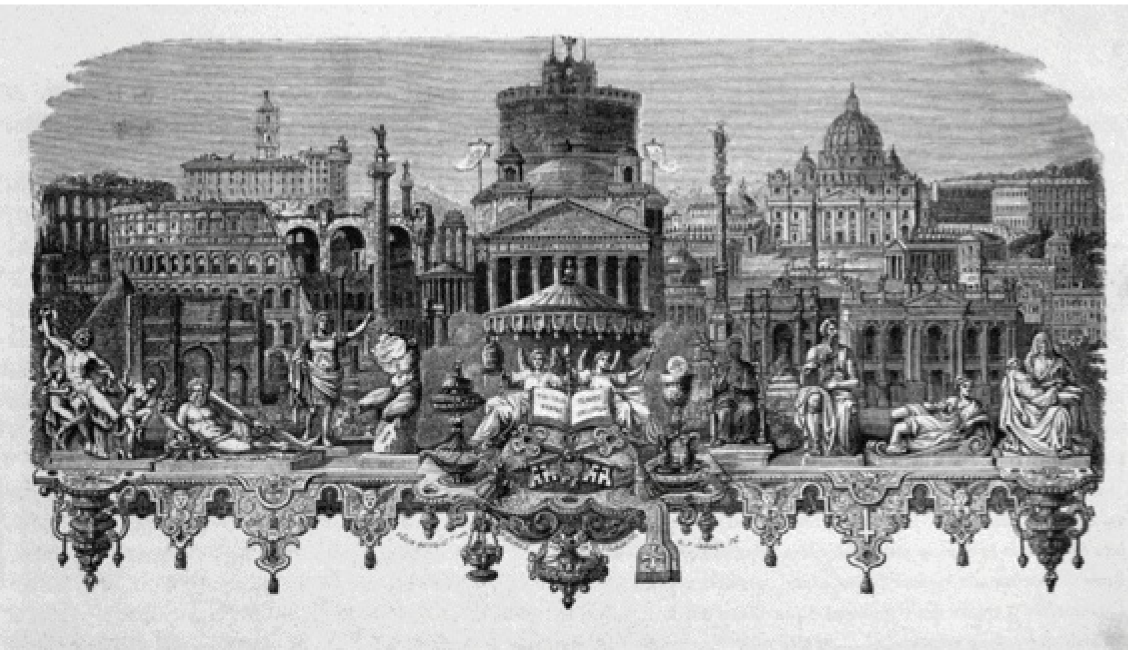
In the late nineteenth century, the Pantheon became hostage to an ideological battle over the city of Rome fought between factions of the Italian government and religious leaders from the Vatican. At stake were the function and identity of the venerable temple. This confrontation grew out of the larger drama of the Risorgimento, the Italian unification movement that began under Napoleon, who briefly united the Italian peninsula under his rule and instigated a burgeoning of nationalistic sentiment.

In the aftermath of Napoleon's defeat in 1815, the peninsula was carved up into numerous small kingdoms and duchies. At first, patriots, notably Giuseppe Mazzini, who founded the revolutionary "Young Italy" political society while in exile in Marseille in 1831, and the military hero Giuseppe Garibaldi sought the creation of an Italian republic. They achieved partial success by capturing Rome in 1849 and proclaiming the Roman Republic. Within six months, however, the French army quashed the uprising, drove Mazzini and Garibaldi back into exile, and restored Pope Pius IX to power. After several false starts in different corners of the peninsula throughout the 1850s, the king of Piedmont-Sardinia, Vittorio Emanuele II of the House of Savoy, and notably his prime minister, Camillo Cavour, spearheaded a successful unification campaign from the north beginning in 1860. To the south, Garibaldi and his famous "thousand" men captured the Kingdom of Two Sicilies, which they turned over to Vittorio Emanuele. The only notable Italian region outside of his control was the Papal States, which spanned the center of the peninsula. In March 1861, Italy was formally established as a constitutional monarchy with its capital first at Turin; in 1865, the capital was transferred to Florence, a more central location. Fierce regionalism, however, threatened to undermine the unification movement unless the only mutually acceptable capital city could be secured – Rome.

The capture of Rome in 1870 presented Italian leaders with the challenge of transforming the capital of Catholicism into the secular capital of their newly unified nation. During the first six years of "Roma Capitale," a coalition of conservatives (the *Destra*), eager to mend relations with the Vatican, controlled the Italian government. Their policy of appeasement came to an end in 1876, when parliament fell under the control of the left (the *Sinistra*) led by anticlerics, who would retain power for the next 25 years – a remarkable duration by Italian standards. For Sinistra leaders, Roman antiquities provided a tangible link to the imperial glory they wished to emulate and a means of superseding church authority. The Pantheon played a decisive role within the larger story of Italy's creation of a national identity in Rome that culminated in the Victor Emanuel Monument, the enormous white marble pile that dominates the north slope of the Capitoline Hill in the center of Rome. The patriotic enterprise profoundly affected the Pantheon itself: we owe to this period some dedicated campaigns of restoration and isolation of the ancient edifice, creating its present-day appearance; the preservation of its function as a church; and the presence of the two royal tombs that dominate the cross axes of the interior.

From the outset of the Risorgimento in the early nineteenth century, most patriots recognized Rome as the only legitimate capital city acceptable to the new country's diverse regions. While the victory of Italian troops in September 1870 brought an end to papal rule over Rome, Italian leaders

confronted a city whose buildings and monuments readily testified to many centuries of ecclesiastical dominion. One contemporary observer, the German historian Ferdinand Gregorovius, commented that "at every step one sees nothing but memories and monuments of the popes: churches, convents, museums, fountains, palaces, obelisks with crosses, the imperial columns with Saints Peter and Paul on their summits, thousands of tombs of bishops and priests, an atmosphere saturated with the spirit of the ruin, of the catacomb and of religion.... All of Rome is like a monument of the Church in all its epochs, from Nero and Constantine down to Pius IX."[1] The Pantheon, the best-preserved vestige of Roman antiquity in the city, epitomized the continuity of the city's life and power from antiquity to the present. Having been, in the seventh century, one of the first of many ancient Roman structures converted to Christian use, it had served as a Catholic church almost three times longer than it had as a pagan temple. This dual significance of the Pantheon, whose history reflected that of the city, inspired French engravers Philippe and Félix Benoist to place it prominently between images of ancient and papal Rome in their *capriccio* for the book *Rome dans sa grandeur* of 1870 (Fig. 12.1).



12.1. C*apriccio* of ancient and papal Romes, by Philippe and Felix Benoist, with the Pantheon at center. (Champagny, *Rome dans sa grandeur*, 1870, frontispiece)

Veneration of ancient Rome was a compelling force throughout the period of unification. It served what one observer called "the sacred flame that alone across many centuries kept the feeling of Italian nationality alive."[2] After 1876, Sinistra leaders exploited this cult of antiquity to fashion a powerful state image. Whereas other nations could only allude to the trappings of the imperial Roman style in architecture, Italians had the inestimable advantage of being able to take possession of genuine antiquities. For the burgeoning secular and scientific culture of nineteenth-century Europe, the monuments of ancient Rome bore the sanctity of Christian relics and the venerable attributes of power. Infused with such potent associations, these monuments became the focus of impassioned disputes among the state, municipal, and religious authorities for matters of custodial responsibility. Michele Coppino, the minister of public instruction in the late 1870s, illustrated the broadly held belief among his national government colleagues when he noted to city officials that "the majesty of [ancient] monuments is always a testimony of the glory of the *secular* world. [Rome] belongs to the entire nation, which demands of His Majesty's government the strictest guardianship of monuments

that are for the fatherland the most glorious heritage."[3] The primacy of Roman antiquities as secular symbols divorced from their ecclesiastical importance reflected a change of perspective that would stir intense controversy over the Pantheon.

Italian leaders faced a unique problem in their new capital – the continued presence of a rival head of state in Pope Pius IX, whose assertions of sovereignty challenged Italian claims to the possession of Rome. Both the Destra and the Sinistra recognized that Vittorio Emanuele II, Italy's first king,[4] could alone offset the prestige commanded by the pope. Although the Risorgimento had produced other heroes, only the king represented both an appealing political position and an image of permanence: Mazzini, the earliest leader of the Risorgimento, and General Garibaldi were both republicans – a political orientation deemed too radical by most Italian leaders; and Cavour, Italy's first prime minister, occupied an office already synonymous with transience in Italy.[5] Prior to 1876, Destra leaders had demanded that Vittorio Emanuele be present in the capital to secure Italian control of the city, but without displays of patriotism that might jeapordize a peace settlement with the Vatican. They wanted the physical presence of a "citizen king and not some Roman conqueror."[6] Despite Italian government efforts to downplay its victory, Pius IX excommunicated Vittorio Emanuele from the Roman Catholic faith in response to the entry of the Italian army into Rome. The Sinistra, by contrast, would exploit and mythologize the royal office as its most powerful propaganda weapon against the papacy. The unexpected death of Vittorio Emanuele II on January 9, 1878, presented the Sinistra government with its first prominent opportunity to become involved in the transformation of Rome and, in the process, create a vivid state image – one that was nationalistic, grandiose, and, above all, secular. Immediate calls for a national monument to the king in the capital ensured government intervention in the city's urban affairs, progressively extending to archaeology, street planning, new public buildings, other civic monuments, and the king's tomb in the Pantheon.

As with all urban projects in Rome sponsored by the anticlerical government, the theme of permanence – reflecting the political aspiration to possess Rome – played a major role in the definition of the king's posthumous image. The concern of Sinistra leaders for permanence dictated that greater emphasis be given to the royal office than to Vittorio Emanuele as an individual. This distinction reflected a long tradition that Ernst Kantorowicz labeled "the King's Two Bodies."[7] According to this tenet, rooted in medieval political theology, the person and the office of the king were separate entities, the former mortal, the latter immortal. For Sinistra leaders, the Majesty of God was secularized into the Majesty of Statehood, but otherwise they conformed to the pattern and its emphasis on outward imagery for the masses. When the Royal House of Savoy organized the lying-in-state of the monarch's corpse in the Sala degli Svizzeri in the Quirinal Palace, they set Vittorio Emanuele in an upright position, signifying the survival and continuity of the royal office beyond the death of the individual king. Ultimately, the enormous Victor Emanuel Monument on the Capitoline Hill celebrated the "immortal" and secular body of the royal office, while the Pantheon remained a sepulcher for the mortal, physical body of Vittorio Emanuele.

Francesco Lattari, the author of a book on Savoy monuments in Rome published in May 1879, provided a detailed explanation of the difference between the two types of monuments and their relative significance. His discussion offers the most explicit contemporary confirmation of an awareness and exploitation of the two-bodies tradition. In a revealing passage, he summarizes how

civil monuments erected to illustrious men are tributes of gratitude and of admiration to their moral persons, they are works intended to celebrate, in a manner independent of their corporeal relics, the accomplishments and glories acquired in the social arena. Sepulchral monuments are attestations of affection and respect to the remains of dear persons, and although some of them might have had or can have simultaneously the same purpose of civil monuments, only for really great men in the advancement of civilization is it deemed to be a more splendid and significant thing to separate the homages to the remains from those to the historic personages. The first monuments are homages to the noble works accomplished by illustrious men, to the ideas that they represent.... The second, by contrast, being homages to the mortal remains of the esteemed, are circumscribed by the just mentioned connections and by religious considerations, which since most ancient times, and especially since the institution of Christianity, are associated with sepulchres.[8]

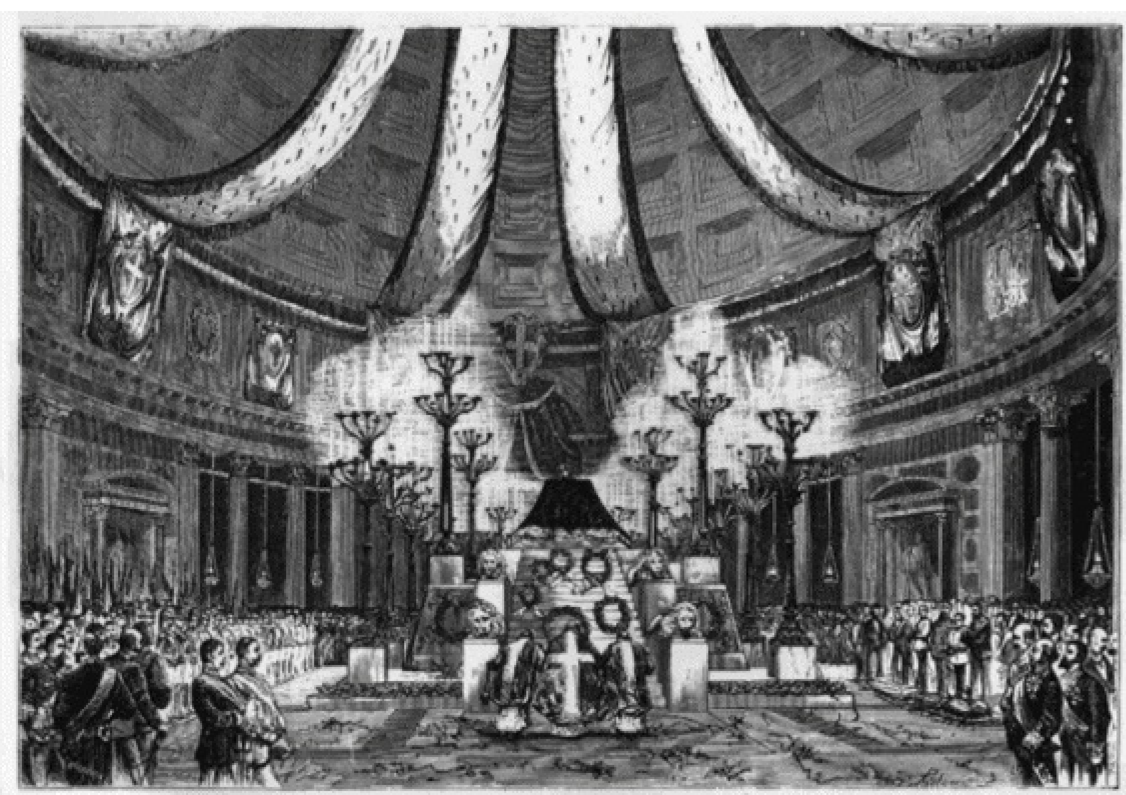
Lattari's observations about the inherently Christian character of sepulchers help account for the slowness with which anticlerical Sinistra leaders would address the issue of the permanent royal tomb. Meanwhile, the news of the king's death stirred a public debate over the location of his tomb. For patriotic reasons, politicians and popular sentiment agreed that Vittorio Emanuele should remain in Rome, rather than be returned to his native city of Turin, the traditional seat of the House of Savoy, for burial in the Superga, the family mausoleum. The new king, Umberto I, agreed on the condition that his father be buried in a place of Catholic worship.[9] This ruled out proposals by some antiquarian enthusiasts to locate the royal sepulcher on the Palatine Hill or the Capitoline Hill.[10] While the Vatican did not oppose the king's burial in a church in Rome, it did prohibit consideration of a location in any of the patriarchal basilicas, namely, the great churches founded by Constantine.[11] Responsibility for selecting a site for the king's tomb fell to Interior Minister Francesco Crispi, one of the more radical anticlerical members of the Sinistra government. He conformed to the restrictions set out by both King Umberto and the pope, yet satisfied his own government's interest in using the symbolic values of antiquity by choosing the Pantheon as the king's resting place.[12]

Part of the appeal of this site stemmed, no doubt, from the term "pantheon" itself, which had by the nineteenth century acquired the secular and nationalistic connotation of a place where a country celebrates and immortalizes its martyrs and great citizens.[13] This tradition goes back to the Christianization of the Pantheon and its rededication to the unnamed martyrs entombed there. Throughout the Renaissance, this tradition embraced famous artists and came to be extended to rulers, as in the royal crypt of the Escorial in Spain, and heroes, as was the case with the church of Ste. Geneviève in Paris, which was renamed Le Panthéon, deconsecrated, and converted in the 1790s into a shrine to the French Revolution. Although some shrines to national heroes go by other names, such as the Walhalla (built 1830–1842) in Germany by the architect Leo von Klenze, "pantheon" was the term most widely employed in the nineteenth century. In the United States, the final but unexecuted design for the Washington Monument of 1845 by Robert Mills included a rotunda 250 feet in diameter at its base that he called the "Pantheon," where niches inside would house statues of the signers of the Declaration of Independence and Revolutionary War heroes.[14] The pedimented portico attached to the western side of the ring of 30 Doric columns (one for each state in the union at the time) made the connection to the Roman Pantheon even stronger. During the Risorgimento, Italians likewise embraced the patriotic pantheon concept, as in the proposal of 1862 for a "Historic-Political-Artistic

Italian National Pantheon" for Turin, and a "Pantheon of Illustrious Men," a fireworks machine for celebrating Italy's constitution day festival in Rome in 1872.[15]

Interior Minister Crispi intended more than mere patriotic commemoration when he selected the Pantheon as the site of the royal tomb. Crispi hoped to augment the legitimacy and permanence of the nascent royal office. As he later declared to parliament, "the throne [of Italy], like the state, must be firm and appear as such, [since] the stability of institutions is revealed to the people by the stability of [their] monuments."[16] Better than any other site in the city, the Pantheon allowed him to align the Italian royal house with the emperors of ancient Rome, particularly the Julian emperors, for whom the Pantheon served as a dynastic sanctuary.[17] In addition to a venerable foundation under Augustus by his first consul, Agrippa, the building possessed the round shape of an imperial mausoleum, like the tombs of Augustus and Hadrian nearby. One contemporary observer recognized the equation, noting that the Roman Pantheon, "which Agrippa magnificently erected in homage to all the gods, we Italians today regard as sacred to another immortal: to our liberator."[18]

The "official funeral" for Vittorio Emanuele, probably organized by the royal house, occurred on January 17, 1878, and was ostensibly a religious service involving the solemn entombment of the king within a provisional resting place inside the Pantheon.[19] The interior decoration of the Pantheon employed a large catafalque, adorned by no fewer than 12 candelabras supporting a myriad of candles and guarded by statues of eight imperial lions (Fig. 12.2). Overhead, long strips of velvet, draped from the oculus and secured at the base of dome, formed an enormous canopy. The king's body was placed atop the catafalque, before being entombed within a provisional "royal chapel" to the right of the high altar – a site chosen by the Reverend Valerio Anzino, the king's chaplain, on orders from Crispi.[20] All of the major European nations had representatives in attendance. Italy's allies sent the most guests of note, including Maria Pia, the queen of Portugal; Prince Ranieri, the archduke of Austria; Prince Wilhelm of Baden; and Friedrich Wilhelm, the imperial prince of Germany.[21]



12.2. View of the official funeral of Vittorio Emanuele II in the Pantheon showing the catafalque

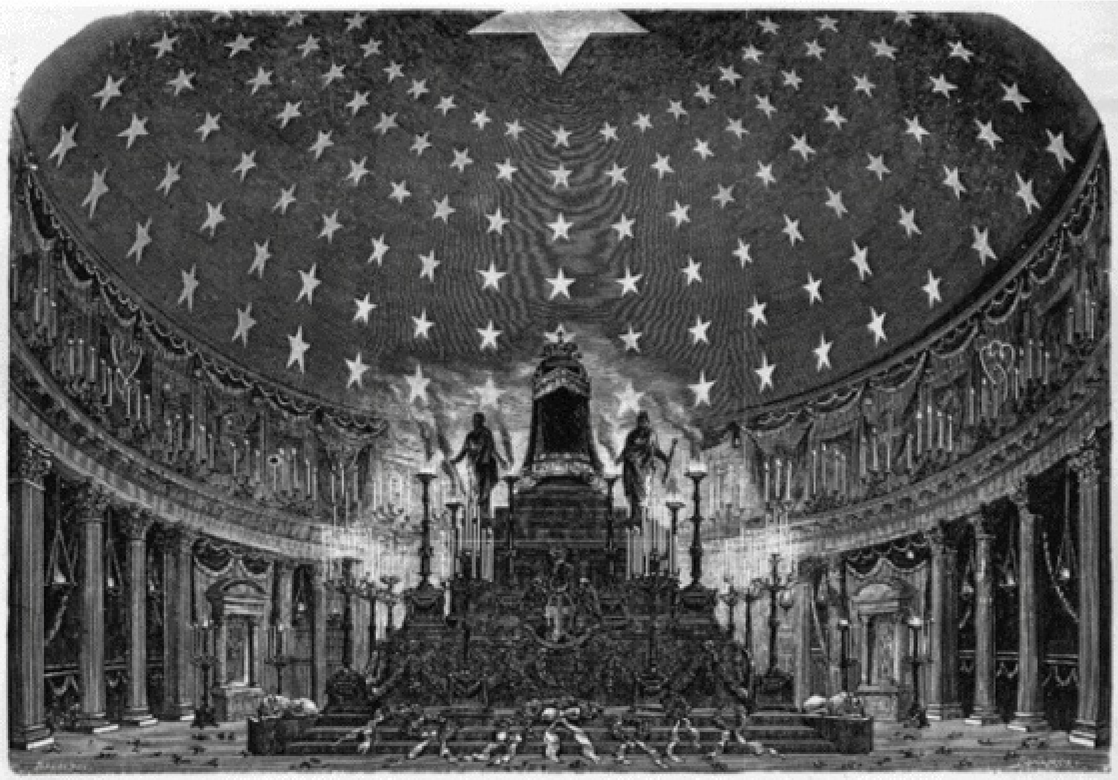
and temporary decorations, January 17, 1878; engraving by Dante Paolocci. (*L'Illustrazione Italiana*, February 3, 1878, p. 68)

The solemnity and grandeur of the ceremonies and the international participation impressed the Romans, who had previously viewed with suspicion the function of Rome as a national capital.[22] The funeral profoundly affected the popular view of the royal family and the king. The newspaper *L'Illustrazione Italiana* reported that the widespread sympathy and patriotism "for the monarchy in our country was practically a revelation. Not only the upper classes, but the middle and lowest classes were moved with such spontaneity and vivacity, from one end of the peninsula to the other, that the ... event became a political event, showing the solidity of the unity of the Italian monarchy. The patriotism won over the republicans and the clericals, save a few and isolated exceptions."[23] This "revelation" reflected the sudden and impressive augmentation of Vittorio Emanuele's reputation in death. For the first time, the king became unquestionably the most potent symbol of Italian unity.

The state exequies, the government's official homage to the deceased monarch, occurred a month later on February 16, 1878, and gave further visual expression to this secular royal cult.[24] Michele Coppino, the minister of public instruction, appointed a committee, composed mainly of professors from the Instituto di Belle Arti in Rome, led by architect Luigi Rosso, to design the elaborate decorative program.[25] Within a month, Rosso's team had adorned the Pantheon with antique regalia that reinforced the burgeoning emblematic power of the king and his office (Fig. 12.3). Their work effectively "restored" the temple to its presumed ancient state, resembling contemporary reconstructions of the building's original appearance. The decorative program fully exploited the symbolic associations of the Pantheon with fame and immortality, as well as its connection to ancient emperors. The tympanum scene, painted by Domenico Bruschi in tempera in imitation of gilt bronze relief, depicted the apotheosis of the royal House of Savoy.[26] It included a winged "angel of the resurrection" sitting atop an "adorned sarcophagus"; below it appeared a crown, scepter, and mantle symbolizing kingship, while to either side personifications of prominent Italian cities pressed toward the center with votive offerings.[27] Above the pediment stood a Roman imperial eagle flanked, at the ends, by allegories of Fame. The two niches of the porch accommodated large, smoking tripods – an ancient symbol of the fusing of divine and heroic.[28] Dynastic imagery continued in the porch, where oval shields of eight counts, dukes, and kings of the House of Savoy adorned the columns. Covering the faint traces of the Agrippan dedication, the temporary new frieze inscription equated Italy's first king with the first emperor of Rome: "Padre della Patria" was a direct translation of "Pater Patriae," the epithet of Augustus.[29]

12.3. Exterior of the Pantheon decorated by Luigi Rosso et al. for the state exequies of Vittorio Emanuele II, February 16, 1878. (Negro 1956, p. 149, Plate 166)

The equally fantastic interior decorations continued the imperial iconography and further disguised the ecclesiastical purpose of the building (Fig. 12.4). An enormous catafalque occupied the center, with reposing lions anchoring its corners and Savoy eagles on each side representing the king's imperial power. Allegories of his personal attributes flanked the draped cenotaph, which was topped by Savoy crests alternating with Victor Emanuel's monogram. Covering the oculus overhead, the enormous "Star of Italy" took its place at the center of 140 gas-lit stars that filled the coffers of the dome.[30] The state exequies provided the first elaborate manifestation of the aggrandizement of the royal office, initiating the highly propagandistic symbolism of the state in the king's image that culminated with the more prominent Victor Emanuel Monument on the Capitoline. The abundant use of the star motif in the coffers and around the oculus recalled a grandiose scheme for similar personal imagery, under Alexander VII in the 1660s, recorded in drawings for the Pantheon.[31]



12.4. Interior of the Pantheon decorated by Luigi Rosso et al. for the state exequies of Vittorio Emanuele II, February 16, 1878; engraving by Dante Paolocci. (*L'Illustrazione Italiana*, March 3, 1878, p. 148)

The presence of the king's tomb transformed the public identity of the Pantheon and gave greater prominence to the issue of who controlled the city's heritage. Having served for more than 1,200 years as a Christian church, it quickly became a national shrine with political associations. While the arrival of the king's remains decisively resolved the long-standing dispute between the Ministry of Public Instruction and the city, with the mayor of Rome ceding to the state responsibility for any restoration work at the temple,[32] a volatile discussion over custody ensued between the Italian government and the Vatican. The Ministry of Public Instruction controlled antiquities as part of the national heritage; however, churches were exempt from state secularization laws. Such architectural hybrids, having both ancient and ecclesiastical importance, presented a special problem of jurisdiction. The entombment of the king in the Pantheon gave Italian leaders an opportunity to seize at least partial control of its interior.

The canons of the church of S. Maria ad martyres resented the imposition on their space caused by the presence of the temporary royal tomb to the right of the high altar. Carmine Gori, the archpriest of their chapter, reminded Giuseppe Fiorelli, the general director of antiquities in the Ministry of Public Instruction, that Benedict XIV's bull of February 18, 1757, had given the Prefecture of the SS. Palazzi Apostolici custody of the whole Pantheon, without distinguishing between interior and exterior jurisdiction; and he added that his chapter did not recognize any other authority or law.[33] Gori also complained vociferously about the many wreaths deposited around the king's temporary tomb, charging that they "disfigure the appearance of the building and of a place considered sacred by the faithful."[34] He requested the removal of the wreaths and of the veterans' guards protecting the tomb because of their propensity to occupy what he called the Sancta Sanctorum, presumably the altar area, even during masses. Fiorelli responded that the papal bulls had been nullified by the termination of

papal temporal power, and he ordered the Pantheon chapter to desist.[35]

The "restoration" effected by the temporary decorations for the state exequies conformed to a widespread desire to restore the Pantheon to its ancient state, a restoration that could be achieved only at the expense of its ecclesiastical character. As soon as the government decided in April 1881 to keep the royal tomb permanently in the Pantheon, Guido Baccelli, who had taken over the Ministry of Public Instruction five months earlier, led a campaign to restore the building's exterior to its presumed "original" state. A radical anticlerical member and a leading enthusiast of ancient sites in the ruling Sinistra, Baccelli advocated the removal of all of the supposedly valueless postantique additions to the Pantheon in order to reveal its distinctive mausoleum-like rotunda. As part of his plans, he hoped to create a large piazza around the temple and call it the "Forum of Vittorio Emanuele."[36] The intended effect was illustrated by a similar project submitted by Pietro Comparini (1833–1882) to the first competition for the Victor Emanuel Monument in 1880 (see Fig. 1.24).[37] Baccelli was not the first to have expressed such wishes. In 1810, Pietro Piranesi, son of the famous engraver, anticipated the minister's own rhetoric:

> the ancient monuments [of Rome] are suffocated by miserable modern buildings which must disappear. The Pantheon, one of the most precious and better preserved monuments of antiquity, requires a grand piazza freeing it of adjacent buildings. To embellish Rome, one must destroy more than build.[38]

The Roman architect Giuseppe Valadier expressed the same idea on paper in 1813, with a plan showing an isolated Pantheon set within a larger and regularized piazza.[39] In November 1870, just two months after the Italian capture of Rome, architecture critic Achille Monti called for the complete removal of all later additions to the monument, including the bell towers.[40] The city incorporated these recommendations into the master plan of Rome of 1873, but financial difficulties, followed by a political dispute with the Ministry of Public Instruction over control of the ancient structure, forced the city to abandon its plans.[41]

Minister Baccelli's restoration technique of isolating and thus monumentalizing the city's antiquities conformed to the ideals of the French restoration theorist Rigaud de l'Isle, whose "theory of the two cities" demanded that ancient monuments be materially liberated from the living urban tissue down to the ancient soil.[42] Contemporary critic Giambattista Demora advocated the same approach, calling on the government to isolate ancient buildings as much as possible in order to render them "inviolate and unhurt," to demolish surrounding buildings of "minimal value," and to keep uncovered and open the most noble parts of ancient Rome.[43] The explicit historical discontinuity manifested by the French polemic must have greatly appealed to Baccelli, who wanted to erase the intervening Christian history of the Pantheon.

The physical isolation of the monument carried out by his Ministry of Public Instruction also illustrated an affinity for the ideals of Camillo Boito, Italy's leading restoration theorist in the second half of the nineteenth century and a member of numerous government building committees in Rome.[44]While Boito condoned the removal of accretions that distorted the legibility of a structure, he opposed their replacement with reconstructions of a supposed original appearance. In May 1881, Baccelli received official authorization to expropriate the seventeenth-century Palazzo Bianchi, one

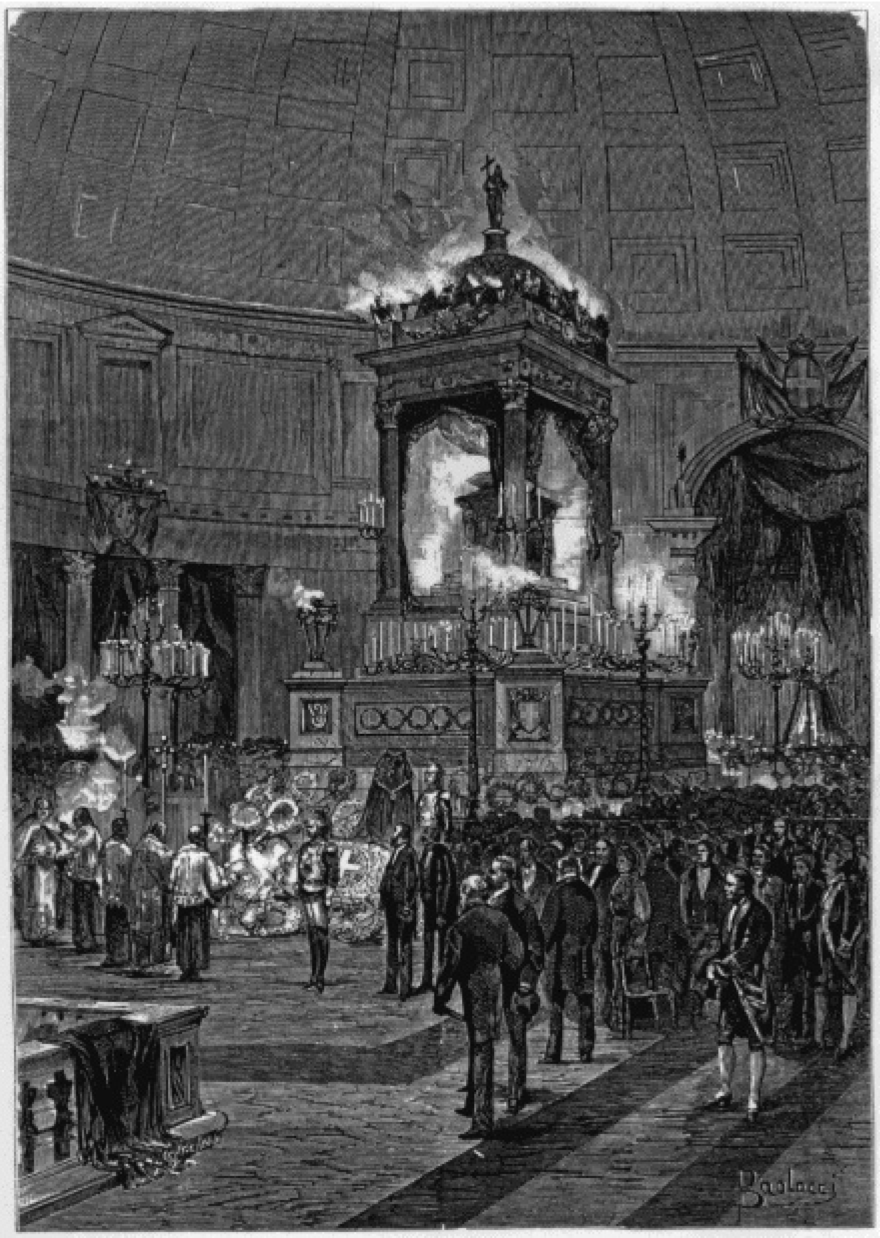
of the buildings attached to the rear of the Pantheon, despite opposition from the state treasury, which had objected to the enormous cost – 415,000 lire.[45] The minister initiated the demolitions himself, taking the first swing of the pick on July 7, 1881,[46] in the same way Benito Mussolini would do with great fanfare to uncover Trajan's Markets in the 1930s. Baccelli's ambition to uncover the girth of the Pantheon in its entirety had to be abandoned when the demolition of the Palazzo Bianchi between July 1881 and March 1882 revealed the attached but deteriorated remains of what were identified at the time as the Baths of Agrippa[47] (but now identified as the Basilica of Neptune), which were conserved with only minor restoration work to ensure their stability.

Beyond scientific and aesthetic reasons for the isolation, Baccelli informed the Italian parliament that he also had political motives: revealing its round shape would stress the new function of the building as an imperial mausoleum.[48] The king's chaplain, the Reverend Valerio Anzino, complained to Prime Minister Agostino Depretis that the "isolation work has deprived the priests of their Sacristy, of the Chapter Hall, and all those accessories that are indispensable to the service of a notable church like the Pantheon, such as the living quarters of the Sacristans, the storage areas for church supplies, [and] the archives."[49] In April 1883, the public instruction minister further diminished the ecclesiastical appearance of the building by demolishing the two bell towers commissioned by Pope Urban VIII in 1626 (Figs. 1.22, 1.23). The work received front-page coverage in the press – as well as much public praise, including two proposals to erect a large plaque commemorating Baccelli's isolation of the building.[50] The critic Costantino Maes hailed Baccelli as "the most sparkling personification of the Roman Genius."[51] Naturally, the Vatican took a dimmer view, with one cardinal calling him "a meathead of a minister."[52]

The isolation of the Pantheon removed all signs of Christian significance from the exterior of the building. A complementary profanization of the interior was initiated with the state exequies of 1878. Commemorations held in the king's memory every subsequent January on the anniversary his death, involving the erection of a large catafalque at the center, became an important event in the official state calendar. Vittorio Emanuele rapidly emerged as the principal object of veneration in a budding secular and highly patriotic "religion of the fatherland":[53] his remains were treated like precious relics to which pilgrimages were made. As with ancient emperors, the king provided the most tangible symbol of the state. Popular epithets applied to Vittorio Emanuele perpetuated his mythologization, such as the "First soldier of the Independence of Italy";[54] the "Great King, founder of the Unity of Italy";[55] the "First Italian citizen";[56] the "Redeemer of the Fatherland";[57] the "Liberator of the Fatherland";[58] and, most frequent of all, the *Padre della Patria* ("Father of the Fatherland"), the conscious equivalent of the ancient title Pater Patriae accorded to the "good" emperors.

The first anniversary commemoration of Vittorio Emanuele's death saw the erection of an impressive temporary catafalque designed by the architect Giuseppe Massuero (Fig. 12.5).[59] The structure took the form of a tall baldachin, one of the most widely recognized symbols of imperial power since late antiquity.[60] Massuero stressed its identification with imperial antiquity by placing four large smoking tripods at the splayed corners of the podium and no fewer than 20 tripods along the attic between imperial eagles at the corners. Under the canopy, an altar supported a cushion on which rested a royal crown. The lone Christian reference appeared in the crucifix held by the figure at the summit. The annual event reused Massuero's temporary structure, perpetuating the memory of the king and reinforcing his association with ancient emperors. Alessandro Guiccioli, a member of

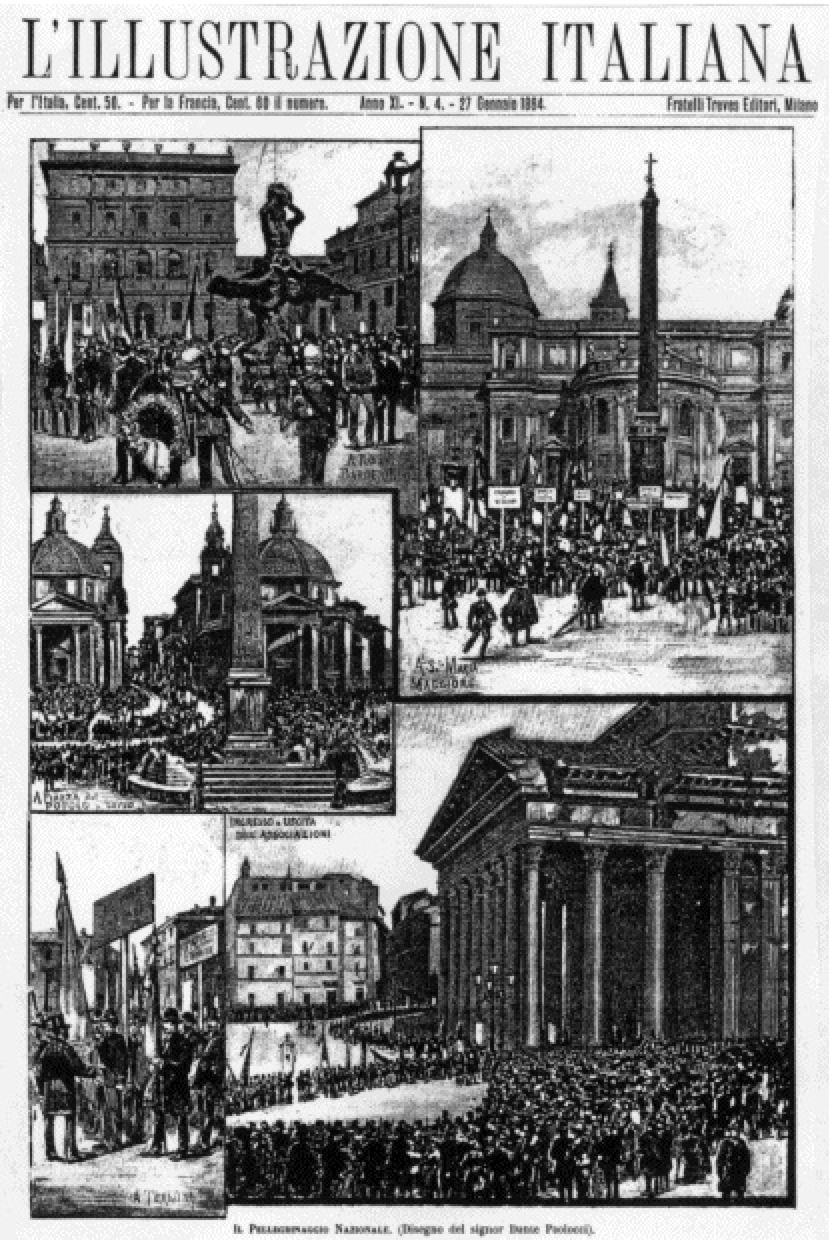
the Chamber of Deputies (the lower house in the Italian parliament), attested to the predominantly secular character of the 1881 commemoration, recording in his diary that "the ceremony was rather arid; the official personages showed off their irreligiosity; all this chills and annoys; it was a civil celebration and not religious."[61] From 1879 to 1884, this annual public ritual offered the capital the most conspicuous display of state imagery, reminding the populace of Rome and any foreign visitors of the imperial stature of the Italian royal house and of the state.



12.5. First anniversary funeral commemoration for Vittorio Emanuele II in the Pantheon, with a catafalque designed by Giuseppe Massuero, January 15, 1879. (*L'Illustrazione Italiana*, January 26, 1879, p. 57)

The progressive mythologizing of Vittorio Emanuele's reputation to signify the notion of Italian unity intensified during the annual commemorations of the king's death in 1883 and 1884. The fifth anniversary observance in 1883 diverged from previous years by including a national pilgrimage. Besides paying homage to the king in the Pantheon, where wreaths were deposited, pilgrims also visited the Capitoline Hill, where the king had first addressed the city in 1870. Within a few months of this event, private organizations around Italy began planning an even grander national pilgrimage to the royal tomb for January 1884.[62] The event had the objective of affirming the "Unity of the

Fatherland" by honoring its founder, Vittorio Emanuele, together with the "four makers" of national unity – King Carlo Alberto (Vittorio Emanuele's father), Cavour, Mazzini, and Garibaldi.[63] Predictably, the government took over control of the event and removed the homages to the other four in order to avoid weakening the centrality of Vittorio Emanuele.[64] The national pilgrimage attracted a large number of participants: 68,635 pilgrims, almost half of whom belonged to 2,061 patriotic associations, as well as 666 representatives from Italian colonies abroad.[65] The press devoted considerable attention to the weeklong event and illustrations testified to the enormous attendance. Public Instruction Minister Baccelli used the occasion to display a full-scale model of the permanen tomb for the king that he was at that time promoting in place of Massuero's catafalque (Fig. 12.6).



12.6. Views of the 1884 national pilgrimage to the tomb of Vittorio Emanuele II, seen (clockwise from upper left) in the Piazza Barberini, behind S. Maria Maggiore, at the Pantheon, at Termini train station, and in Piazza del Popolo. (*L'Illustrazione Italiana*, January 27, 1884, p. 53)

The patriotic fervor for the royal cult displayed in the national pilgrimages ensured the permanent tomb for Vittorio Emanuele a place of great symbolic importance in the capital. Yet the Sinistra government had done little to facilitate its completion for several years after the king's death,

presumably due to the inherently Christian character of sepulchers. Public impatience for a suitable permanent tomb stirred the journalist Ugo Pesci in January 1882 to criticize the government for spending 500,000 lire on the expropriation of one house on the exterior of the Pantheon and to suggest that that sum could have paid for a great porphyry urn in the center of the temple.[66] Significantly, he saw the tomb as a key symbol of Italy's permanent possession of Rome and thus encouraged its rapid completion "so that all the foreigners will see that even in death Vittorio Emanuele affirms the conviction of wanting to remain in Rome."[67]

Responsibility for the permanent tomb initially belonged to the Royal House of Savoy. After several unsuccessful attempts to stir government interest, the Reverend Anzino, the king's chaplain, "finally found the strong support of the Minister of Justice, Commander Villa," who provided a budget of 150,000 lire for moving the royal remains to the first chapel to the left of the door.[68] Anzino had chosen that unobtrusive location "so that visitors will be free to visit the tomb, without disturbing the functions of the church."[69] Furthermore, he sought a discreet design that maintained the curving lines of the Pantheon, and he wished to avoid using allegorical statues that might provoke ecclesiastical authorities.[70] In similar deference to the church, he commissioned Giuseppe Massuero, author of the annual catafalque, to design "*not a monument*, but a simple deposit worthy of the Great King."[71] Massuero's design, the drawings for which have been lost, consisted of a porphyry urn resting on a marble and porphyry podium and flanked by a pair of bronze candelabras.[72] This scheme was approved by royal decree on April 10, 1881.

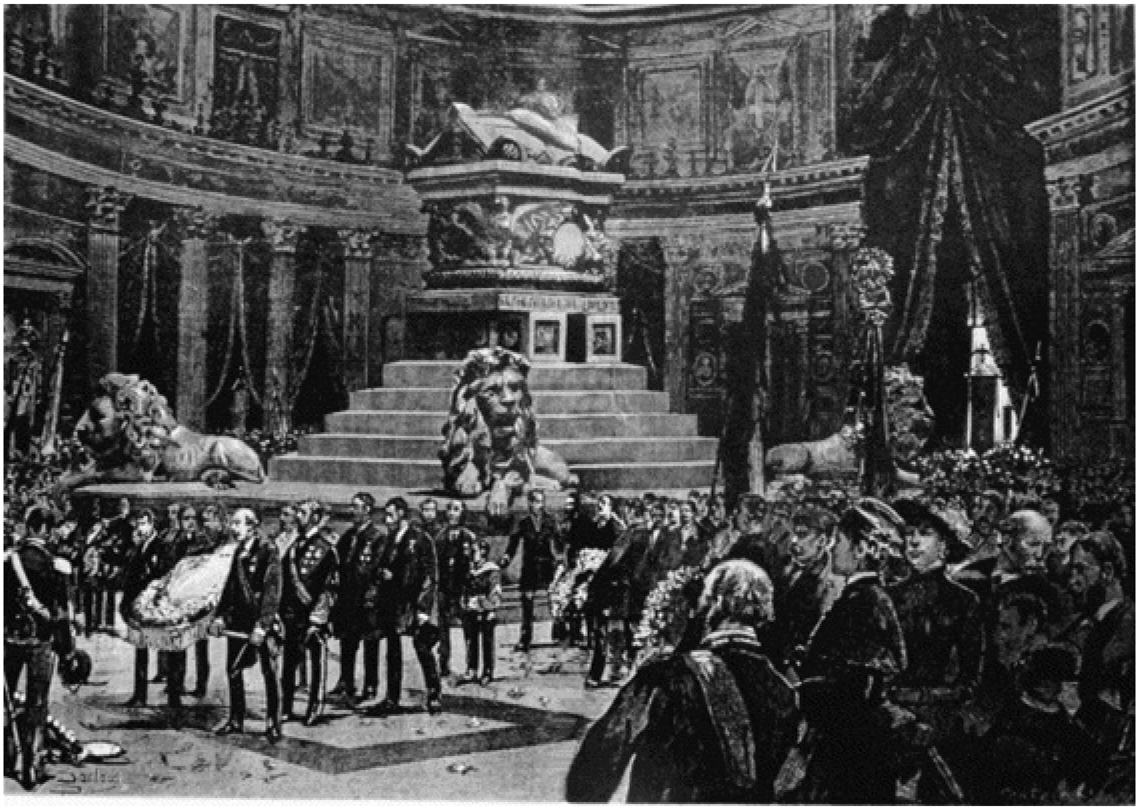
In late 1881, the Ministry of the Royal House inexplicably passed responsibility for the permanent royal tomb to Public Instruction Minister Baccelli.[73] One can only imagine the delight with which this anticlerical zealot greeted the opportunity to meddle with the interior of the venerable structure. Baccelli acted swiftly: in January 1882 his ministry's Fine Arts Commission promptly rejected the proposal of the royal house to relocate the tomb within the first chapel to the left of the door, because it lacked "the majesty of concept and of form" implied in the royal decree of April 1881.[74] Instead, the commission supported Baccelli's idea of erecting the royal sepulcher in the middle of the Pantheon, which emulated the placement of an emperor's ashes at the center of an ancient mausoleum. Due to the threat of flooding, the project called for a tall structure, with the king's body resting 5.2 meters above floor level, just above the five-meter-level achieved by the disastrous Tiber flood of December 1870.[75] Giulio Monteverde, a professor of sculpture at the Istituto di Belle Arti in Rome began designing the tomb in mid-1883. By November, the project was sufficiently advanced for the ministry to receive an offer of free marble from the proprietor of an ancient Roman quarry.[76]

Even more than the exterior restoration, the tomb would have allowed Baccelli to challenge the ecclesiastical purpose of the building with a function that responded to its round shape. Whereas other Sinistra leaders recognized that the tomb would inevitably have a sepulchral character with Christian overtones that distinguished it from the purely civil purpose of a national monument (in keeping with the two-bodies tradition), Baccelli, however, either misunderstood or ignored this distinction. Instead, he saw the tomb in the secular terms of the religion of statehood and asserted to parliament in December 1882 that the competition for a national monument to the king on the Capitoline was a useless endeavor, since the Pantheon already "had all the qualities to be rebaptised with the name *National Monument*."[77] His agenda was clear: the royal tomb offered the opportunity to take over the Pantheon completely, with a massive monument erected at its center. That the highly

controversial idea confused sepulcher and civil monument probably accounted for the absence of support from his government colleagues.

Not surprisingly, the project aroused bitter opposition from the Vatican. Having seen the zeal with which Baccelli operated, the deacon cardinal of the Pantheon vowed that the "Holy See must never permit the erection of any monument in the center of that Temple, either temporary or permanent."[78] The Vatican took the threat to this church seriously enough to convoke a "Cardinalate Congress": four cardinals met on October 23, 1883, to devise a strategy to block the endeavor. The cardinals opposed the project on canonical – not aesthetic – grounds, arguing that tombs located at the center of a church or even above floor level were reserved for the bodies of saints.[79] The excommunicated monarch was certainly no saint. They noted the same regulations that had prevented the realization of Michelangelo's tomb for Julius II at the center of St. Peter's. Recognizing the anticlerical and nationalistic intentions of Baccelli, the cardinals feared that his plan would set a precedent for the deconsecration of other "Christian temples." They concluded, "such a monument would essentially change the nature and scope of the Sacred Temple. Its principal object is the worship of God, of the Blessed Virgin and of the Martyrs; after the erection [of the monument] it would principally serve funeral homages to a King. At present the Pantheon has all the grandeur of a Basilica; in the new project it would be converted into a great royal tomb, to which the remainder would serve only as a mere accessory."[80]

In flagrant defiance of Vatican opposition, Baccelli achieved temporary fulfillment of his ambitious scheme. For the occasion of the 1884 national pilgrimage to Vittorio Emanuele's tomb and in place of Massuero's annual catafalque, Baccelli commissioned Giulio Monteverde to erect a "simulacrum" of his design, as mentioned previously for the royal tomb at the center of the Pantheon (Fig. 12.7).[81] Monteverde rejected the baldachin form of Massuero's catafalque, perhaps to avoid its ecclesiastical associations. Instead, his construction involved a massive ancient-style sarcophagus rising eight meters above a broad ten-meter-wide base anchored at the corners by imperial lions.[82] Around the podium appeared bronze plaques of the principal Italian cities. On January 13, 1884, *L'Illustrazione Italiana* confidently reported that the "new tomb ... will contain the venerated body of King Vittorio" and would require four years for construction.[83]



12.7. Giulio Monteverde, “simulacrum” of the proposed tomb of Vittorio Emanuele II in the Pantheon, seen during the national pilgrimage to the king’s tomb, January 1884; engraving by Dante Paolocci. (*L’Illustrazione Italiana*, January 13, 1884, pp. 28–29)

Baccelli’s victory was short-lived. In addition to Vatican protests, the aesthetic and structural concerns of the Fine Arts Commission and Prime Minister Agostino Depretis’s lack of support for Baccelli combined to scuttle the central tomb project. The Fine Arts Commission, having initially supported the project, expressed doubt that the ancient drains under the pavement could support the weight of so massive a monument, and they ruled out the possibility of moving the drains.[84] Exposure to the elements under the open oculus further detracted from the appeal of a central tomb. For reasons of aesthetic integrity, the commission opposed glazing the aperture, as it had also done in 1879 at the request of the Pantheon chapter.[85] One other factor, possibly the decisive one, undoubtedly contributed to the demise of Baccelli’s proposal – the tradition of the “king’s two bodies.” For several years, Prime Minister Depretis had energetically promoted a grandiose national monument – to become the Victor Emanuel Monument erected between 1885 and 1911 – at a location separate from the king’s tomb in the Pantheon. Depretis illustrated his lack of support for the project by ordering in January 1884, following the national pilgrimage, the prompt removal of the simulacrum to some other location.[86] Moreover, he replaced Baccelli as minister of public instruction with Michele Coppino two months later. The move toward a more discreetly sepulchral and less literally monumental tomb assured its distinction from the national monument.

On orders from King Umberto I in late December 1883, the Ministry of Public Instruction organized the relocation of the king’s remains to the central tribune on the west side of the Pantheon, supplanting the Chapel of the Holy Spirit.[87] The actual translation ceremony took place on January 5, 1884, during the national pilgrimage events. Sometime in mid-1884, the Fine Arts Commission requested designs from Giuseppe Sacconi (1854–1905) and Manfredo Manfredi (1859–1927) for a permanent tomb sited within the central tribune. The two young architects had come in first and

second, respectively, in the second competition for the Victor Emanuel Monument on the Capitoline Hill on June 24, 1884, and their rival designs for the tomb conformed to the official, neo-antique architectural language of the state. Both had trained at the Istituto di Belle Arti in Rome under Luigi Rosso, the designer of the funeral decorations at the Pantheon in 1878. While Sacconi won the monument competition, Manfredi received the commission to design the royal tomb as a "consolation" prize.[88]

Although Baccelli's project for a central tomb failed to materialize, its strongly neo-antique character remained a salient part of the eventual tomb. After experimenting with a wide variety of schemes involving freestanding or engaged sarcophagi and elaborate relief sculptures on the tribune wall, Manfredi arrived at a final design by 1887. Aesthetic respect for the uncomplicated forms of the Pantheon dictated a highly simplified design, far removed from Baccelli's grandiose vision. His scheme comprised a variety of motifs assiduously copied from ancient models, including a pair of candelabras, a pagan altar – so-called by one contemporary commentator[89] – and an imperial eagle framed by a wreath and clutching bound fasces, this last an ancient symbol of unity highly appropriate to the king who oversaw the unification of Italy. A simple gilded inscription on the face of the main bronze panel – VITTORIO EMANUELE II / PADRE DELLA PATRIA – celebrated his most famous and explicitly imperial epithet (Plate XIV). The scheme emphasized the ancient spirit of the building to such an extent that it contained no reference to its Christian purpose. The ministry's Fine Arts Commission (which by 1887 included among its members Manfredi's rival, Giuseppe Sacconi) made significant modifications to the design. They removed the pagan altar and added bronze crosses in the panels flanking the tomb, to give the design its definitive appearance. In execution, the tomb also contributed to the restoration of the building, with the recreation of the ancient marble placage on the niche wall. The bronze components of the tomb employed more symbolically charged material, acquired by melting cannon that had fired in defense of the Roman Republic in 1849 and in one of the Risorgimento battles of 1859.[90]

Perhaps the most significant aspect of the tomb as designed by Manfredi was the absence of the traditional effigy of the deceased. This aspect of the composition provided further evidence that the two-bodies tradition exerted a strong influence on the thinking of Sinistra leaders. According to this tradition, "the two bodies, unquestionably united in the living king, were visibly segregated on the king's demise" and that of the two, effigies represented the immortal body.[91] In Rome, the government interpreted this tenet in the most literal way possible: Vittorio Emanuele's mortal body remained in his dynastic mausoleum of the Pantheon; the king's immortal body – the Italian royal office – was commemorated by the Victor Emanuel Monument on the Capitoline, where an effigy of the king appears in the glorified form of an imperial equestrian statue (Fig. 12.8). By maintaining the important distinction between the king's two bodies, Sinistra leaders ensured that the national monument would remain a permanent symbol of the Italian state's *secular* authority.

12.8. Monument to Vittorio Emanuele II, Rome, by Giuseppe Sacconi, 1885–1911. (Photo author)

During the 1890s, the identity of the Pantheon changed in a highly unexpected and, for Guido Baccelli, an unwelcome way. Investigatory work conducted in January 1892 by Georges Chédanne (1861–1940), a French *pensionnaire* in Rome, revealed brickstamps throughout the structure dating to the time of Hadrian, and not Agrippa as stated in the frieze inscription.[92] The redating, and concomitant reattribution, of this most venerable relic of Roman antiquity brought Chédanne considerable attention: by year's end, he had received the Crown of Italy medal from the Italian government.[93] The Ministry of Public Instruction, under Pasquale Villari, moved quickly to excavate inside the temple to find Agrippa's Pantheon. The work, carried out in 1892 and 1893, was supervised by Luca Beltrami, an art historian, trained architect, and member of parliament from Milan, who had supported Chédanne's work.[94] He was assisted by Pier Olinto Armanini, a 22-year-old prize-winning architect in Rome, who created the drawings that documented their findings. The exhibition of Armanini's drawings in Rome in 1895 brought the news of the Hadrianic provenance of the Pantheon to the attention of Public Instruction Minister Guido Baccelli,[95] evidently for the first time. Earlier that year, Baccelli had undertaken the recreation of the original bronze inscription dedicated to Agrippa – 25 one-meter-tall letters – using 800 kilograms of bronze acquired from the Ministry of War.[96] Upon hearing from Armanini that the Pantheon was not built by Agrippa, Baccelli reacted angrily: "Yet I have placed in bronze letters on the frieze of the Pantheon AGRIPPA FECIT until I shall be with Minerva, vivaddio! Hadrian has nothing to do with it!"[97] His vehement reaction suggests that his restoration of the Agrippan inscription had been an attempt to suppress the building's newly uncovered Hadrianic provenance and that the association of the Pantheon with the Julian dynasty had been a significant part of its appeal when Crispi had selected it as the final resting place for Vittorio Emanuele II.

The burial in the Pantheon in 1900 of King Umberto I, Vittorio Emanuele's son and successor who was assassinated in the northern Italian city of Monza, strengthened its role as a dynastic mausoleum.

He was interred in the central tribune on the east side of the interior, directly opposite the tomb of his father. Guiseppe Sacconi, architect of the Victor Emanuel Monument, received the commission to design the tomb, for which he resuscitated his design for Vittorio Emanuele's tomb that had placed second to Manfredi's. It comprises a large rectangular marble panel flanked by an allegorical figure on each end, all set before a heavily garlanded sculptural backdrop above. Inscribed on the panel is the simple inscription UMBERTO I / RE D'ITALIA. In front, between the two ancient columns of the niche, Sacconi placed a porphyry altar supporting a bronze crown on a marble cushion. Ironically, Sacconi had been on the committee 13 years earlier that had rejected an almost identical altar designed by Manfredi for Vittorio Emanuele's tomb as being too pagan in character. Apart from Umberto's widow, Queen Margherita of Savoy, who was interred below her husband's tomb in 1926, no other Italian monarchs would be laid to rest in the Pantheon. By the time Umberto's successor, his son Vittorio Emanuele III, died in 1947, Italy had become a republic.

By 1900, the Pantheon had witnessed more than a half century of struggles to define modern Italy. For Italians, the city of Rome represented the dream of a united peninsula and, through association with the city's ancient past, the aspiration for rekindled national greatness. Nowhere was this equation more powerfully felt than at the Pantheon. On the occasion of the entombment of Umberto, the antiquarian Ciro Nispi-Landi described the Pantheon as "the ring that reconnects the ancient and modern times, the ancestral art to that of our time, the power of Rome to the nationality of we Italians today."[98] The various attempts to forge this ring on the part of the secular Italian government reflected their larger struggle to acquire political legitimacy, particularly in the face of the ongoing presence of the papacy in Rome. Throughout the various attempted transformations of the Pantheon, the government encountered divergent ideals of preservation, rival claims to ownership, and conflicting patriotic visions, especially concerning how best to commemorate the king. The result, in the end, was a series of generally restrained interventions that defined the building we see today: closer to its ancient appearance than it had been for centuries on the exterior, yet only modestly altered physically on the interior, but typologically enriched by its new symbolic role as a dynastic mausoleum. In the larger scheme of modern Italian politics, the exploitation of the ancient Pantheon and the compromises brokered there between Italian and Vatican authorities closely anticipated the manner in which Mussolini attempted to establish his own authority in Rome after 1925.

Material for this chapter has been drawn from my Ph.D dissertation, "Rome as State Image: The Architecture and Urbanism of the Royal Italian Government, 1870–1900" (University of Pennsylvania, 1993). My research and ideas were further developed through a pair of conference papers delivered at the annual meetings of the Society of Architectural Historians in 1993 and the College Art Association in 2000. I owe special thanks to my dissertation advisor, David Brownlee, as well as to Lars Berggren, John Pinto, Mark Hewitt, Tod Marder, Greg Willams, and David Gobel for their insightful assistance.

1 Ferdinand Gregorovius, quoted in Silvio Negro, *Seconda Roma: 1850–1870*, Rome 1943; repr. Vicenza 1966, p. 30. All translations by the author, unless otherwise indicated.

2 Pietro Rosa, *Sulle scoperte archeologiche della città e provincia di Roma negli anni 1871–72*, Rome 1873, p. 1.

3 Letter, Coppino, Ministro della Pubblica Istruzione, to Mayor of Rome, Aug. 17, 1876, Archivio Centrale dello Stato, Rome, Direzione Generale di Antichità e Belle Arti, versamento 1, busta 81, fascicolo 109, sotto-fascicolo 14.

4 Vittorio Emanuele II was the second king in the House of Savoy by that name. With the creation of Italy as a constitutional monarchy, Vittorio Emanuele II became the new country's first king, but he retained his ordinal number to preserve the continuity of the Savoy dynasty.

5 From 1861 to 1876, there were 15 different governments in Italy under nine different prime ministers.

6 "Il Re a Roma" and "La via de' trionfatori," *L'Opinione*, Oct. 24 and 26, 1870.

7 Ernst H. Kantorowicz, *The King's Two Bodies: A Study in Mediaeval Political Theology*, Princeton 1957; see especially, "The King Never Dies," pp. 314–450.

8 Francesco Lattari, *I monumenti dei principi di Savoia in Roma*, Rome 1879, p. 321.

9 Letter, Anzino to Depretis, Feb. 14, 1883, Archivio Centrale dello Stato, Rome, Ministero del Interno, Gabinetto, Atti Diversi, Ser. 1849–95, busta 8, fascicolo 9.

10 Renzo U. Montini, *Tombe di Sovrani in Roma*, Rome 1957, p. 31.

11 Letter, Anzino to Depretis, Jan. 11, 1878, Archivio Centrale dello Stato, Rome, Depretis, serie 1, busta 23, fascicolo 83.

12 Letter, Anzino to Depretis, Feb. 14, 1883, Archivio Centrale dello Stato, Rome, Ministero del Interno, Gabinetto, Atti Diversi, serie 1849–95, busta 8, fascicolo 9.

13 Earlier manifestations of the same concept, such as the Temple of English Worthies (1734) at Stowe, did not use the term "pantheon."

14 See Pamela Scott, "Robert Mills and American Monuments," in John M. Bryan, ed., *Robert*

Mills, Architect, Washington, DC 1989, pp. 157–171.

15 Domenico Mollajoli, *Progetto di un Panteon Nazionale italiano Storico-Politico-Artistico*, Turin 1862; the "Pantheon" fireworks machine was designed by architect Gioacchino Ersoch and is illustrated in Bruno Tobia, *Una patria per gli italiani*, Rome 1991, p. 8 (Fig. 1).

16 Crispi, speeches of Mar. 10 and 17, 1881, *Atti Parlamentari, Camera, Discussioni*, pp. 4250 and 4457.

17 William C. Loerke, "Georges Chédanne and the Pantheon: A Beaux Arts Contribution to the History of Roman Architecture," *Modulus: University of Virginia School of Architecture Review* 4, 1982, pp. 40–55; p. 41. See here Chapter Two.

18 "Il Pellegrinaggio nazionale," *L'Illustrazione Italiana*, Jan. 13, 1884, p. 22.

19 *L'Illustrazione Italiana*, Jan. 27, 1878, p. 50, and Feb. 3, 1878, p. 68.

20 Letter, Anzino to Depretis, Feb. 14, 1883, ACS, Min.Int, GabAD, Ser.1849–95, b.8, f.9.

21 "Elenco delle Persone Reali e Personaggi dei seguiti Loro presenti ...," Jan. 17, 1878, Archivio Centrale dello Stato, Ministero della Real Casa, Ufficio del Prefetto di Palazzo, filza 34, 1878.

22 Fiorella Bartoccini, *Roma nell'Ottocento: Il tramonto della "Città Santa," nascita di una capital*, 2 vols., Istituto Nazionale di Studi Romani, Storia di Roma, Bologna 1985, vol. 2, pp. 484–485.

23 "Rivista Politica," *L'Illustrazione Italiana*, Jan. 27, 1878, p. 50.

24 No literature exists on royal exequies in nineteenth-century Italy. The organization, timing, and decoration of such events, to judge from those held for Vittorio Emanuele II in the Pantheon, appear entirely consistent with seventeenth-century exequies in the Spanish court, which are discussed at length by Steven N. Orso, *Art and Death at the Spanish Hapsburg Court*, Columbia, Mo., 1989.

25 Basilio Magni, *Descrizione dell'apparato fatto nel Pantheon*, Rome 1878, p. 5, n. 1; see Silvio Negro, *Album Romano*, Rome 1956.

26 “L’esequie per Vittorio Emanuele nel Pantheon,” *L’Illustrazione Italiana*, Mar. 3, 1878, p. 139.

27 Magni 1878, p. 7.

28 Letter, Angelo Vecellio to Ministro della Pubblica Istruzione [Baccelli], Nov. 12, 1883, Archivio Centrale dello Stato, Rome, Direzione Generale di Artichità e Belle Arti, versamento 1 busta 123, fascicolo 174, sotto-fascicolo 3.

29 Armando Ravaglioli (*Roma umbertina*, Rome 1984, p. 97) asserts without elaboration or proof that the second funeral was the first time Vittorio Emanuele was defined as *Padre della Patria*.

30 Magni 1878, pp. 13–14. To fuel the starry display, architect Antonio Viviani brought in an underground gas line from the Teatro Argentina, more than 300 meters to the south (though it is unknown how these were installed inside the coffers); see letter, Ministro del Interno [Depretis] to Ministro della Pubblica Istruzione [Baccelli], Aug. 5, 1882, Archivio Centrale dello Stato, Rome Direzione Generale di Artichità e Belle Arti, Monumenti e Onoranze a Uomini Illustri, busta 10 fascicolo “1878–1894. Roma. Morte di V...E... II ed onoranze anniversarie.”

31 On this scheme, see Richard Krautheimer, *The Rome of Alexander VII, 1655–1667*, Princeton 1985, pp. 104–109; and Tod A. Marder, “Bernini and Alexander VII: Criticism and Praise of the Pantheon in the Seventeenth Century,” *Art Bulletin* 71, no. 4, 1989, pp. 628–645.

32 Copy of letter, Mayor of Rome to Prefetto della Provincia di Roma, undated, enclosed with letter, Prefetto della Provincia di Roma to Ministro della Pubblica Istruzione [Coppino], Feb. 15 1879, ACS, DGABA, Vers.1, b.119, f.172, sf.19.

33 Letter, Gori, Arciprete at Pantheon, to Fiorelli, Mar. 8, 1879 [date received], Archivio Centrale dello Stato, Rome, Direzione Generale di Antichità e Belle Arti, versamento 1, busta 120, fascicolo 172, sotto-fascicolo 34.

34 Letter, Gori to Fiorelli, Mar. 8, 1879.

35 Letter, Fiorelli to Gori, Aug. 18, 1879, Archivio Centrale dello Stato, Rome, Direzione Generale di Antichità e Belle Arti, versamento 1, busta 120, fascicolo 172, sotto-fascicolo 34.

36 Auturo Bianchi, “Le vicende e le realizzazioni del piano regolatore di Roma Capitale,” *Capitolium* 10, 1934, pp. 33–47; p. 37.

37 Pietro Comparini, *Monumento nazionale da erigersi in Roma al re Vittorio Emanuele II: progetto del cav. Pietro Comparini architetto a Firenze,* Florence 1881. The author wishes to thank Claudia Conforti and Carla Trovini for clarifying the identity of this architect and bringing to light this source.

38 Letter, P. Piranesi to French Minister of the Interior, June 24, 1810, quoted in Pierre Pinon, "Piazze e monumenti di Roma," in *Forma*, ed. A. Capodiferro, Rome 1985, pp. 48–49; p. 48.

39 Valadier's plan is illustrated in Pinon 1985a, p. 48.

40 Achille Monti, "Il Pantheon di Roma," *Il Buonarroti*, November/December 1870, pp. 318–321.

41 Copy of an undated letter from the Mayor of Rome to the Prefetto della Provincia di Roma enclosed with letter, Prefetto della Provincia di Roma to the Ministro di Pubblica Istruzione Archivio Centrale dello Stato, Rome, Direzione Generale di Antichità e Belle Arti, Versamento 1 busta 119, fascicolo 172, sotto-fascicolo 19.

42 De l'Isle's "theory of the two cities" was first applied in Rome to Trajan's Column, in a project designed by Valadier but carried out only after the departure of the French. For a brief discussion of his theory, see Pierre Pinon, "Roma antica e Roma moderna: sovrapporre o giustapporre," in *Forma*, ed. A. Capodiferro, Rome 1985, pp. 21–23.

43 See Giambattista Demora, *Il Piano Regolatore di Roma e le antichità classiche*, Rome 1882, pp. 71–77.

44 Boito summarized his ideas on restoration in Camillo Boito, *Il nuovo e l'antico in architettura*, ed. Maria Antonietta Crippa, Milan 1989, pp. 107–126. See also Alberto M. Racheli, "Restauri a Roma capital. Teorie da Camillo Boito a Gustavo Giovannoni: tra conservazione e innovazione," in *Forma*, ed. A. Capodiferro, Rome 1985, pp. 86–90.

45 Decreto [contratto], Baccelli, Ministro della Pubblica Istruzione, Nov. 9, 1881, Archivio Centrale dello Stato, Rome, Direzione Generale di Antichità e Belle Arti, Versamento 1, busta 119, fascicolo 172, sotto-fascicolo 37.

46 Costantino Maes, *Il Pantheon: Le espropriazioni e le demolizioni alle Terme di Agrippa*, Rome 1881, p. 7.

47 See "I restauri del Pantheon." *L'Illustrazione Italiana*, Apr. 15, 1883, p. 234.

48 Baccelli, text of speech entitled "Onorevoli Colleghi!" n.d. [ca. Dec. 1881], Archivio Centrale dello Stato, Rome, Direzione Generale di Antichità e Belle Arti, Versamento 1, busta 120, fascicolo 172, sotto-fascicolo 37.

49 Letter, Anzino to Depretis, Feb. 14, 1883, Archivio Centrale dello Stato, Rome, Direzione Generale di Antichità e Belle Arti, Versamento 1, busta 123, fascicolo 174, sotto-fascicolo 1.

50 See letter, Azzurri, Presidente, Accademia Romana di S. Luca, to Ministro della Pubblica Istruzione [Baccelli], Apr. 18, 1882, and letter, Avv. Trotti to Fiorelli, Apr. 28, 1882, Archivio Centrale dello Stato, Rome, Direzione Generale di Antichità e Belle Arti, Versamento 1, busta 121, fascicolo 173, sotto-fascicolo 1. Regarding the front-page coverage, see *L'Illustrazione Italiana*, Apr. 15, 1883.

51 Maes 1881, p. 28.

52 Letter, Cardinal Francesco Bartolini to "Eminenza Reverendissima," undated [ca. Oct. 1883], Archivio Segreto Vaticano, Segretario de Stato, 1883, Rubrica 165, fascicolo unico, p. 15. Original phrase: *testa bistacco di ministro*.

53 "Il Pellegrinaggio nazionale," 1884, p. 22.

54 Quoted in Tobia 1991, p. 139.

55 Report, Commissione Permanente delle Belle Arti, Jan. 18, 1882, Archivio Centrale dello Stato, Rome, Direzione Generale di Antichità e Belle Arti, Versamento 1, busta 123, fascicolo 174, sotto-fascicolo 2.

56 Letter, Vecellio to Ministro della Pubblica Istruzione [Baccelli], Nov. 12, 1883, Archivio Centrale dello Stato, Rome, Direzione Generale di Antichità e Belle Arti, Versamento 1, busta 123, fascicolo 174, sotto-fascicolo 3.

57 Letter, Falconieri to Umberto I, Nov. 10, 1883, Archivio Centrale dello Stato, Rome, Direzione Generale di Antichità e Belle Arti, Versamento 1, busta 123, fascicolo 174, sotto-fascicolo 3.

58 Letter, Ministro della Pubblica Istruzione [De Sanctis] to Ministro della Real Casa, Dec. 6 1878, Anchivio Centrale dello Stato, Rome, Direzione Generale di Antichità e Belle Arti, Concors Vari, busta 6, fascicolo "Roma. Progetti pel Monumento Nazionale al Re Vittorio Emanuele II."

59 Letter, Ministro della Pubblica Istruzione [De Sanctis] to Ministro della Real Casa, Dec. 6 1878, Archivio Centrale dello Stato, Rome, Direzione Generale di Antichità e Belle Arti, Concors Vari, busta 6, fascicolo "Roma. Progetti pel Monumento Nazionale al Re Vittorio Emanuele II."

60 James S. Ackerman, *The Architecture of Michelangelo*, rev. ed., Chicago 1986, pp. 163–164.

61 Alessandro Guiccioli, "Diario del 1881," *Nuova Antologia* 71, fascicolo 1544, July 16, 1936, p. 184.

62 For an exhaustive analysis of the organization and significance of the national pilgrimage of 1884, see Tobia 1991, pp. 100–142.

63 Tobia 1991, p. 111.

64 Tobia 1991, pp. 113, 137–138.

65 Tobia 1991, p. 136.

66 See, for example, Ugo Pesci, "La Tomba del Gran Re," *L'Illustrazione Italiana*, Jan. 22, 1882, p. 74.

67 Pesci 1882.

68 Letter, Anzino to Depretis, Feb. 14, 1883, Archivio Centrale dello Stato, Rome, Direzione Generale di Antichità e Belle Arti, Versamento 1, busta 123, fascicolo 174, sotto-fascicolo 1.

69 "Relazione a S.E." [Depretis], on paper "Ministero dell'Interno: Gabinetto," is a precis of the letter and its appended documents, Anzino to Depretis, Feb. 14, 1883, Archivio Centrale dello Stato, Ministero del Interno, Gabinetto, Atti Diversi, Ser. 1849–95, busta 8, fascicolo 9.

70 Note marked "N.B.," unsigned and undated, Archivio Centrale dello Stato, Ministero del Interno Gabinetto, Atti Diversi, Ser. 1849–95, busta 8, fascicolo 9.

71 Letter, Anzino to Depretis, Feb. 14, 1883, Archivio Centrale dello Stato, Rome, Direzione Generale di Antichità e Belle Arti, Versamento 1, busta 123, fascicolo 174, sotto-fascicolo 1.

72 "Relazione a S.E.," ca. Feb. 1883, Archivio Centrale dello Stato, Ministero del Interno Gabinetto, Atti Diversi, Ser. 1849–95, busta 8, fascicolo 9.

73 Letter, Ministro della Real Casa to Baccelli, Ministro della Pubblica Istruzione, Nov. 12, 1881 and letters, Baccelli to Ministro della Real Casa, Nov. 18, 1881, and Feb. 3, 1882, Archivio Centrale dello Stato, Rome, Direzione Generale di Antichità e Belle Arti, Versamento 1, busta 123, fascicolo 174, sotto-fascicolo 1.

74 Report of the Commissione Permanente di Belle Arti of Jan. 18, 1882, quoted in letter, Baccelli to Ministro della Real Casa, Feb. 3, 1882, Archivio Centrale dello Stato, Rome, Direzione General di Antichità e Belle Arti, Versamento 1, busta 123, fascicolo 174, sotto-fascicolo 1.

75 Note marked "N.B.," unsigned and undated, Archivio Centrale dello Stato, Ministero del Interno Gabinetto, Atti Diversi, Ser. 1849–95, busta 8, fascicolo 9.

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78 Letter, Filippo Gargano to "Eminenza Reverendissima" [Cardinal Bartolini?], Oct. 1883 Archivio Segreto Vaticano, Segretaria di Stato 1883, Rubrica 165, fascicolo unico, p.14.

79 The details of this paragraph are drawn from the letter, Cardinal Bartolini to the deacon cardinal of the Pantheon, Sbarretti, Oct. 29, 1883, Archivio Segreto Vaticano, Segretaria di Stato 1883 Rubrica 165, fascicolo unico, pp. 34–42.

80 Letter, Cardinal Bartolini to the deacon cardinal of the Pantheon, Sbarretti, Oct. 29, 1883 Archivio Segreto Vaticano, Segretaria di Stato 1883, Rubrica 165, fascicolo Unico, p. 40.

81 Letter, Depretis to Baccelli, Jan. 29, 1884, Archivio Centrale dello Stato, Rome, Direzion Generale di Antichità e Belle Arti, Versamento 1, busta 123, fascicolo 174, sotto-fascicolo 5.

82 “Il Pellegrinaggio nazionale,” 1884, p. 22.

83 “Il Pellegrinaggio nazionale,” 1884, p. 22.

84 Note marked “N.B.,” unsigned and undated, ACS, Min. Int, GabAD, Ser. 1849–95, b.8, f.9.

85 Letter, Gori to Ministro della Pubblica Istruzione [Coppino], Jun. 18, 1879, ACS, DGAB Vers.1, b.120, f.172, sf.34.

86 Letter, Depretis to Baccelli, Jan. 29, 1884, ACS, DGABA, Vers.1, b.123, f.174, sf.5.

87 Letter, Fiorelli to Ministro della Real Casa, Dec. 26, 1883, ACS, DGABA, Vers.1, b.123, f.17 sf.4.

88 Franco Borsi and Maria Cristina Buscioni, *Manfredo Manfredi e il classicismo della nuova Italia*, Milan 1983, p. 15. Letter, Fiorelli to Morelli, Jul. 11, 1884, ACS, DGABA, Vers.1, b.12 f.174, sf.1. Fiorelli invited Morelli to examine the models presented by Manfredi and to report the modifications he deemed necessary. Fiorelli did not mention any other architects’ projects, suggesting that the ministry had already awarded the commission to Manfredi.

89 “Al Pantheon,” *La Voce della Verità*, Dec. 18, 1885.

90 Borsi and Buscioni 1983, p. 95.

91 Kantorowicz 1957, p. 423.

92 The discovery was reported early on by Rodolfo Lanciani, *Pagan and Christian Rome*, Boston 1892. See also Loerke 1982, pp. 40–55.

93 Loerke 1982, p. 43.

94 Loerke 1982, p. 42.

95 Baccelli had been reappointed as minister of public instruction, his fourth turn in this position, in December 1893 in the third government of Francesco Crispi.

96 Letter, Baccelli to Mocenni, Ministro della Guerra, Sept. 7, 1894, Archivio Centrale dello Stato, Rome, Direzione Generale di Antichità e Belle Arti, Versamento 1, busta 121, fascicolo 173, sotto-fascicolo 1.

97 Quoted in Loerke 1982, p. 44.

98 Ciro Nispi-Landi, *Marco Agrippa, I suoi tempi e il suo Pantheon, attualmente tomba dei Re d'Italia Vittorio Emanuele II–Umberto I di Savoia*, Rome 1901, p. 109.

Thirteen The Pantheon in the Modern Age

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Perhaps no other historical building has engendered such profound and varied echoes as the Pantheon in Rome. Because of this widespread and recurring influence, William L. MacDonald justifiably entitled his study of the Pantheon's "progeny" with the epithet "the most celebrated edifice" – translated from the Latin inscription that Pope Urban VIII had placed near the entrance in 1632. MacDonald's overview demonstrates how widely and how often the Pantheon served as a model for subsequent buildings.[1] To complement MacDonald's admirably encyclopedic survey, which focused on the plethora of edifices that took the Pantheon as its model, this chapter focuses on the ways in which the Pantheon repeatedly was favored to house new institutions of the modern world or to reflect the redefinition of traditional institutions in modern ways: the spread of religious tolerance, the birth of modern medicine and science, the embrace of a cosmopolitan spirit, the rise of democratic government, the creation of the public museum and public library, and the emergence of an aesthetic and psychological consciousness with peak experiences outside of the context of organized religion. This architecture emerged primarily during the Neoclassical period from the mid eighteenth through early nineteenth centuries and then again in the twentieth century with an appreciative rediscovery of this earlier era.

The Spread of Religious Tolerance

Whereas the Enlightenment certainly did not invent the phenomenon of religious tolerance, it did embrace it and make it a central feature of a cultural objective that gained increasing acceptance over the succeeding two centuries, such that it has become a commonplace in our notion of what constitutes a modern, civilized world. This principle was embedded within the founding documents of the two major democratic revolutions of the late eighteenth century. Article 10 of the French Declaration of the Rights of Man and of the Citizen (Déclaration des droits de l'homme et du citoyen, August 26, 1789) stipulated, "No person shall be persecuted or constrained because of his opinions, even religious, provided that their display does not disturb public order as established by the law."[2] Similarly, the opening clause of the first of the initial 10 amendments to the American Constitution, dating from December 15, 1791, also addressed this issue: "Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof." Centuries of experience with religious wars and religious persecution in Europe had made these provisions necessary. Yet even before these revolutions, the extension of religious tolerance had been reflected in the design of houses of worship in German lands, where the Pantheon became a favored prototype to be emulated.

It has been suggested that King Friedrich II of Prussia, also known as Frederick the Great, selected the Pantheon as the model for the Catholic Cathedral of Saint Hedwig in Berlin (Fig. 13.1) as a humanitarian gesture of religious tolerance accorded to Catholics after conquering the predominantly Catholic territories of Silesia.[3] Thus, the ancient Roman temple of all the gods now became an example of universal Christian tolerance. Although the Berlin church, designed by the French

expatriate architect Jean-Laurant Legeay in 1747, had a variegated history of construction, reconstruction, and redesign, it always presented on the exterior and interior a variant of the Pantheon.[4] The Pantheon-inspired Saint Hedwig's became the model for other German Catholic churches. These include Friedrich Weinbrenner's Church of Saint Stephen in Karlsruhe (1808–1814) where the Catholics had been given religious freedom by Napoleon, and Georg Moller's Church of Saint Ludwig in Darmstadt (1820–1827), where the Catholic community had been emancipated in 1790.[5]

13.1. View of the Forum Fredricianum, Berlin, with St. Hedwig's Cathedral.

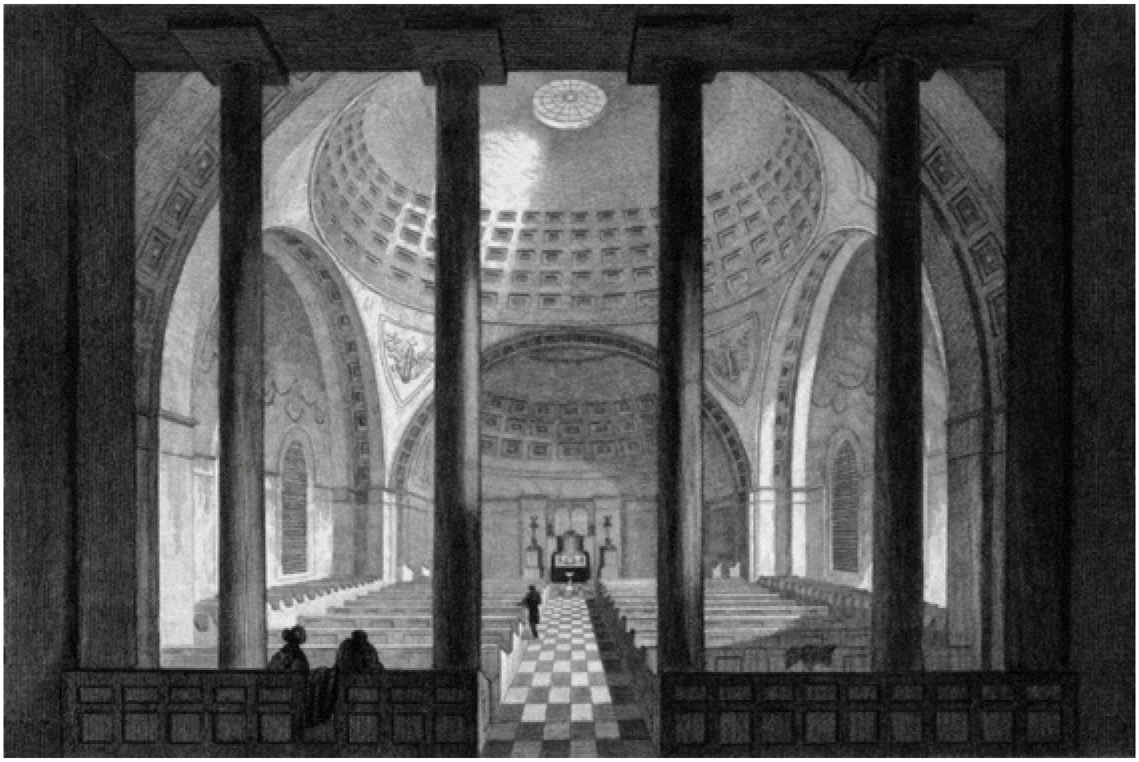
Legeay had won the Prix de Rome at the Académie Royale d'Architecture in 1732 and, hence, had spent the years 1737 to 1742 in the Eternal City where he had had ample opportunity to study the Pantheon itself.[6] So taken was he with this Roman edifice that in 1766 he subsequently suggested that Paris, as the capital of France, had great need of a Pantheon-inspired church, which he designed as a church dedicated to the Trinity.[7] Although ostensibly consecrated to the Catholic faith, Legeay's Paris church project presents a paving pattern of interlocking triangles that may very well have been symbols of Freemasonry, a popular movement in the Enlightenment whose goals included religious tolerance among a host of humanitarian ideals.

Many Enlightenment Freemasons most likely were Deists, who believed that divinity could be found in Nature and, hence, who rejected traditional, religious sects. According to Alexis de Tocqueville, who in 1831 spent nine months traveling throughout the United States with his fellow Frenchman Gustave de Beaumont, the Unitarians whom they encountered in this country were, in effect, really Deists:

> On the confines of Protestantism is a sect which is Christian only in name, the *Unitarians*. Among the Unitarians, that is to say among those who deny the Trinity and recognize only one God, there are some who see in Jesus Christ only an angel, others a prophet, others, lastly, a philosopher like Socrates. They are pure Deists. They speak of the Bible because they do not

wish to shock public opinion, still entirely *Christian*, too deeply. They have a service Sundays; I was there. There they read verses of Dryden or other English poets on the existence of God and the immortality of the soul. A discourse is made on some point of morality, and it's done.[8]

Given this typically Enlightenment approach to religion, it should not surprise that the French émigré Maximilian Godefroy recently had designed the interior of the First Unitarian Church (Fig. 13.2) in the manner of the Pantheon, which readily could become the symbol for the unity and divinity of Nature and of God as well.



13.2. Maximilian Godefroy, First Unitarian Church, Baltimore, 1818. (Photo: Courtesy of The Maryland Historical Society)

A distant echo of Godefroy's church can be found in Frank Lloyd Wright's Unity Temple (Oak Park, 1906), which joins a cubical house of worship with a rectangular social hall. Although one can only speculate as to whether the Roman Pantheon or even Godefroy's Pantheon-like house of worship had exerted an influence on Wright, the architect's decision to design the place of worship in the temple as a centralized space, turned inward on itself and lit from the top by a combination of clerestory windows and coffered ceiling skylights, certainly adapts the principle of the Pantheon to a modern aesthetic. Whereas Wright selected reinforced concrete for Unity Temple ostensibly because of the financial constraints imposed by the budget and probably also because of the challenge to transform a lowly, utilitarian material from the world of engineering into the highest building program in society, that is, a house of worship, one also wonders whether this choice of material might not also have been a silent homage to the greatest concrete edifice of the ancient world.

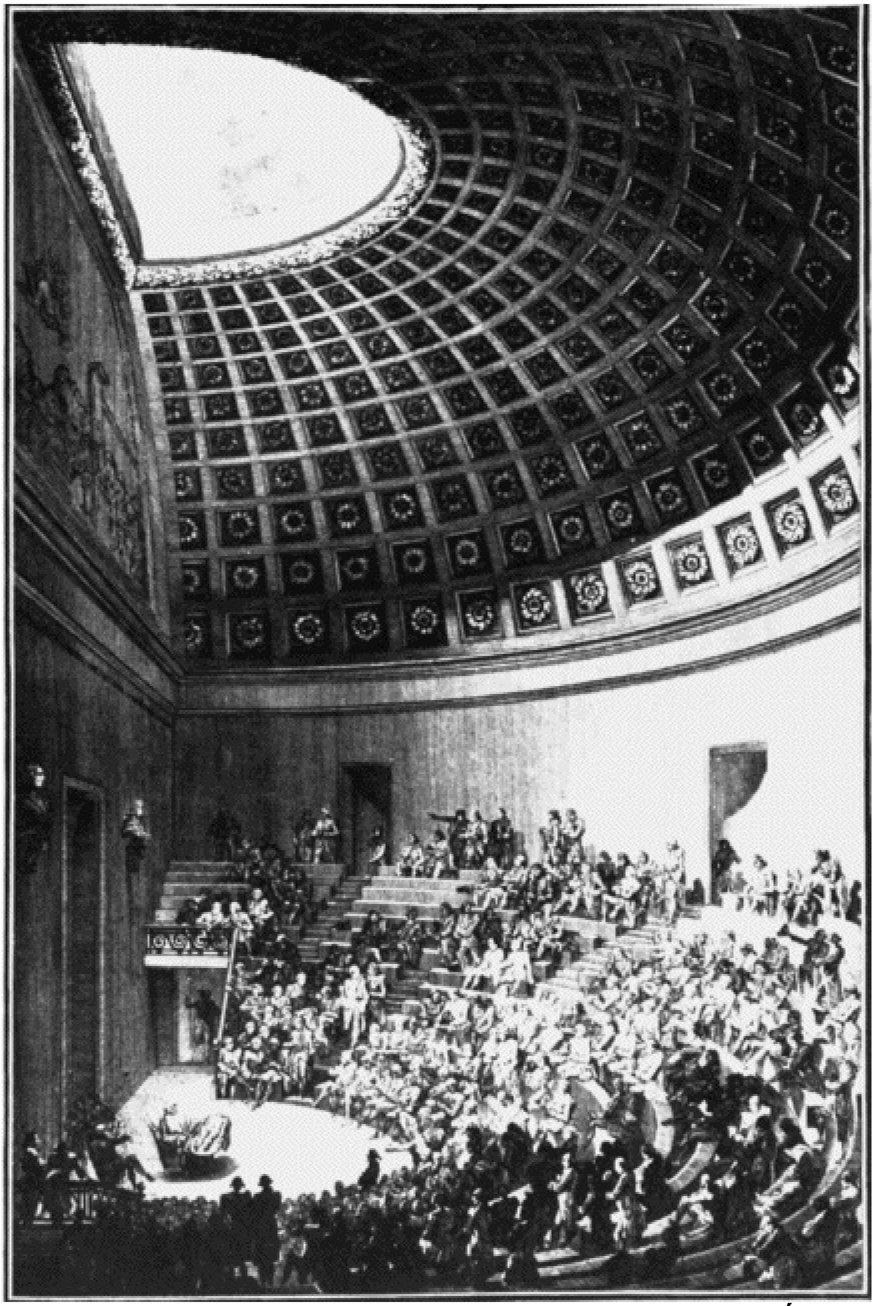
Toward the end of Wright's career when he designed the Guggenheim Museum in New York City, he commented that this museum was "my Pantheon."[9] How long had he had his eye on this Roman monument? Wright had a long-standing interest in classical architecture, from the classicizing frieze around the living room of his Oak Park House (1889–1911) to the Beaux-Arts Plan of the Imperial

Hotel (1915–1922) to his unexecuted personal funerary chapel, which he named the Unity Temple and Cenotaph (1958).[10]

The Birth of Modern Science and Medicine

The Enlightenment was, in many respects, the epoch of the birth of modern science and medicine. William Harvey, "considered by many to have laid the foundation of modern medicine ... was the first to demonstrate the function of the heart and the complete circulation of the blood," with findings and theories published in *On the Movement of the Heart and Blood in Animals*(1628).[11] Similarly, Sir Issac Newton's *Philosophiae naturalis principia mathematica* (Mathematical Principles of Natural Philosophy, 1687) famously postulated the principle of universal gravitation to explain the motions of heavenly bodies, as well as of falling bodies on earth, but which also explained the phenomena of tides and more generally established principles for the fields of dynamics and fluid mechanics.[12] Then, in the third quarter of the eighteenth century, Joseph Priestley and Antoine-Laurent Lavoisier engaged in a race to explain the nature of oxygen and the mechanism of human respiration. Around the same time, Dr. Jan Ingen-Housz elucidated the complementary cycle in the plant world with the intake of carbon dioxide and the release of oxygen.[13] These theories and discoveries were reflected in the world of architecture through a variety of buildings and projects that honored the Enlightenment's advances in science and medicine by reference to the Pantheon.

This engagement between science and architecture includes the anatomy amphitheater, the principal room in Jacques Gondoin's new building constructed in Paris to house the École de Chirurgie (Fig. 13.3). The new School of Surgery owes much to its patron, Germain Pichault de la Martinière, since 1747 *premier chirurgien* (head surgeon) to the French king and a man who secured great prestige for the profession, which, already in 1731, had been separated from the fields of medicine and pharmacy through the creation of its own, independent academy. In the popular mind, "surgeons had for a long time been confused with barbers," according to Sébastien Mercier's often-trenchant commentary on commonplace subjects: "It was a harmful confusion, it had to end." When the new academy was ratified in 1750, the act called for the creation of a new anatomy amphitheater to replace what one scholar has termed the already "impressive anatomy theater" dating from the early seventeenth century in the neighborhood where Gondoin's edifice would soon be constructed.[14]



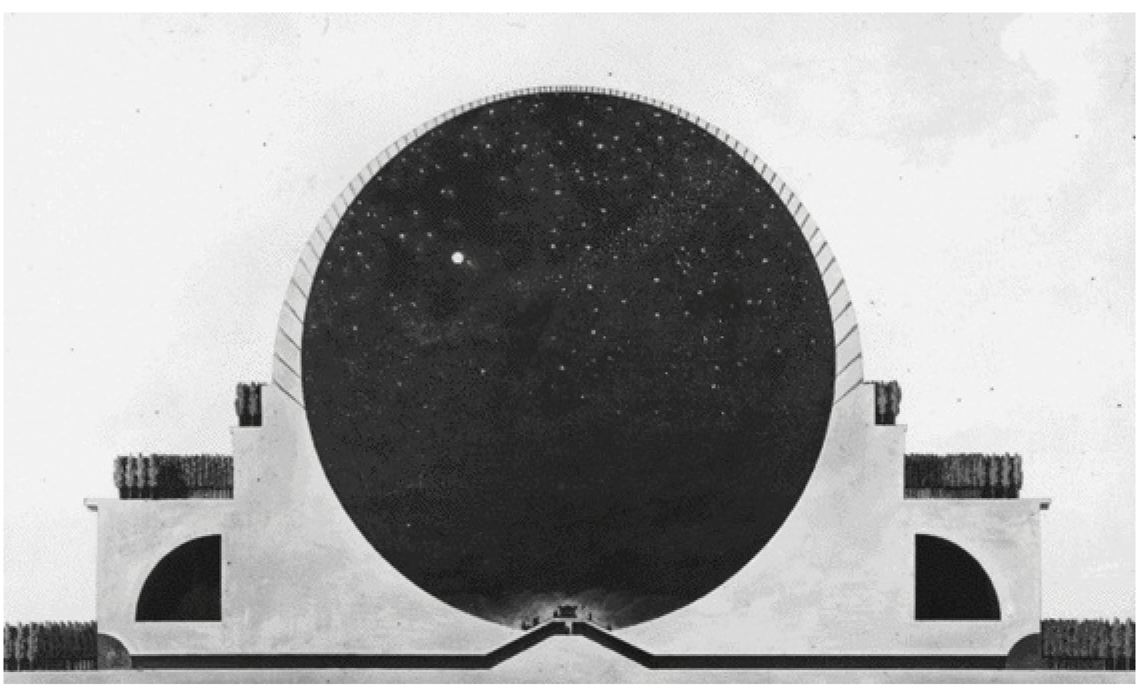
13.3. Jacques Gondoin, anatomy amphitheater, École de Chirurgie (School of Surgery), Paris, 1769–1774.

Gondoin’s School of Surgery featured a central triumphal arch entrance in the middle of a columnar peristyle that supported the school’s library and that served as a ceremonial propylaeum to the central courtyard where, to the far side and on the central axis, a grand portico graced by the Corinthian order provided the facade to the anatomy amphitheater, which was the climax of this elaborate but direct architectural promenade. Semicircular in form and reminiscent of an ancient Roman theater, the anatomy amphitheater was crowned with a coffered half dome inspired by the Pantheon, including its central oculus, which in this case was “greater in diameter” than the Roman model[15] so as to provide adequate natural light directly over the anatomy table itself. The Pantheon-like half dome abuts a flat wall, whole lunette conceptually completing the circle, while rendering its universal meaning specific: the half dome represents the cosmos, and the lunette portrays the great anatomists, including de la Martinière, who had penetrated its secrets.

To appreciate more fully the cosmic symbolism of the Pantheon within the context of

Enlightenment medicine, we should briefly consider the work of the famous *philosophe* Julien Offroy de La Mettrie, author of *L'Homme-Machine* (Man, the Machine, 1748). Trained as a surgeon, La Mettrie published his philosophical text to explain the wonder of life, especially in the thinking and feeling human being with his moral and creative capacities, rooted in the materiality of the body, whose "marvels" have been discerned by "doctors who were philosophers and not by philosophers who were not doctors."[16] La Mettrie praised, in particular, the insights about "the material unity of man" garnered by the seventeenth-century anatomist Giovanni Alfonso Borelli.[17] The "complex machine" of the human body discussed in La Mettrie's treatise anticipated, in many respects, the latest medical research of the twenty-first century, where scientists still display awe in the face of little-understood operations of neurons in their interface with thought and feeling. La Mettrie's account of the actions of the body's "machine" in its relationship to the mind or spirit reads much like today's descriptions of "the secrets of mirror neurons," which one journalist recently has termed "cells that read minds."[18] This wonder and these insights afforded by mid eighteenth-century surgery and anatomical studies found a fitting setting under the Pantheon-inspired half dome of Gondoin's anatomy amphitheater.

The enthusiasm for Newton's scientific theories in the eighteenth century was widespread and was aptly reflected by Alexander's Pope's assessment: "Nature and Nature's laws lay hid in night:/ God said, Let Newton be: and all was light." In France, Madame du Châtelet (Gabrielle-Émilie de Breteuil), wife of the Marquis du Châtelet-Laumont, lieutenant general of the king's armies, published a French translation in 1756, with a helpful commentary, of Newton's *Philosophiae naturalis principia mathematica*, with subsequent editions in 1768 and 1775. There also were popularizing accounts intended for a broader public, such as Voltaire's *Éléments de la Philosophie de Newton* (Elements of Newton's Philosophy) and a French translation of Francesco Algarotti's *Il newtonismo per le dame* (Newton for Ladies). In 1784, Étienne-Louis Boullée, one of the luminaries of the Académie Royale d'Architecture, designed a cenotaph to honor Newton (Fig. 13.4), whose actual grave was in Westminster Abbey, where many of Great Britain's great citizens had been buried.[19] It appears that the Academy's enthusiasm for Boullée's design prompted it to sponsor a Prix d'émulation with the same theme in January 1785, where it characterized Newton as "the greatest genius."[20]



13.4. Étienne-Louis Boullée, Cenotaph to Sir Isaac Newton (project), 1784. (Photo: Bibliothèque nationale de France)

Unlike Gondoin, who had made clear reference to the Pantheon in his anatomy theater, Boullée took advantage of the full spherical form that could be inscribed within the Pantheon to transform the ancient Roman prototype into a Deist celebration of Nature. The exterior honors Newton for having determined that the Earth had been a perfect sphere before it was flattened by rotation:

> Sublime mind! Vast and profound genius! Divine being! Newton, please deign to accept the homage of my limited talent.... O, Newton! Since you, through the breadth of your intelligence and the sublimity of your genius, were able to determine the shape of the Earth, I have conceived the project to envelope you within your discovery. This is like enveloping you within yourself.... For this reason, I have used the figure of the Earth for your sepulcher.

The interior honors Newton for having elucidated the physical principles of the universe, notably the movements of the heavenly bodies:

> My imagination surveyed the grand images of nature. I shuddered at the thought of not being able to recreate them. It is within the realm of immortality, it is in the sky that I wanted to place Newton.

Designing the interior of the cenotaph as a spherical cavity punctuated in the upper half by holes that would enable the sunlight to shine through like twinkling stars of the nighttime sky, Boullée used these "stars" as his sepulchral lamp:

> The interior of this sepulcher is conceived in the same spirit. By using, O Newton, your divine system to form the sepulchral lamp that illuminates the tomb, I have made myself, so it seems to me, sublime.[21]

Had this project been constructed, it would have been an early example of a planetarium. Boullée's Cenotaph to Sir Isaac Newton was the second of his major buildings to encapsulate the immensity of Nature that he discussed in his essay on architecture; the other was his Metropolitan Church project (ca. 1781–1782), where he expressed his boundless admiration for the Pantheon in the form of homage to Michelangelo:

> Michelangelo, painter, sculptor, and talented architect, addressing the task of designing Saint Peter's basilica and wanting to surpass all of the beautiful monuments of Rome, especially the Rotunda, about which he always spoke with the highest praise, astonished the entire world. He proposed to construct a dome as vast as that of the Pantheon such that it would be the crown of the building, whose vaults would support this immense mass: an idea so grand, so daring, so astonishing that, if it had not been executed and if today somebody had made such a proposal, one would have certainly contested its feasibility![22]

Inspired by Michelangelo's daring design for Saint Peter's dome and wanting his church "to give the impression of the universe" in all of its immensity,[23] Boullée proposed the elevation of a comparable dome in such a manner that it would seem to float miraculously on high. Then, several years later, when designing the Cenotaph to Newton, the architect left behind the domed Greek-cross model of Michelangelo's Saint Peter's, which he had used as the basis for his church project, to adapt the spherical cavity implied by the entire interior of the Pantheon into a Deist celebration of Newton's discoveries.

During the French Revolution, the Institut de France, founded in 1795 as the successor body to the royal academies,[24] selected a cenotaph to Newton as the theme for a Prix d'émulation in 1800. The winning prize by C. Gay imagined a spherical cavity fully lit with stars and set within a stepped pyramid, each level symbolic of an earlier astronomical chronology. On top of the pyramid, a colossal bronze statue of Newton sits majestically on a throne, as the great scientist pensively determines the "system of the universe." Newton is crowned with an aureole of seven rays, one for each of the "primitive colors" that he had "discovered" by diffracting light through a prism.

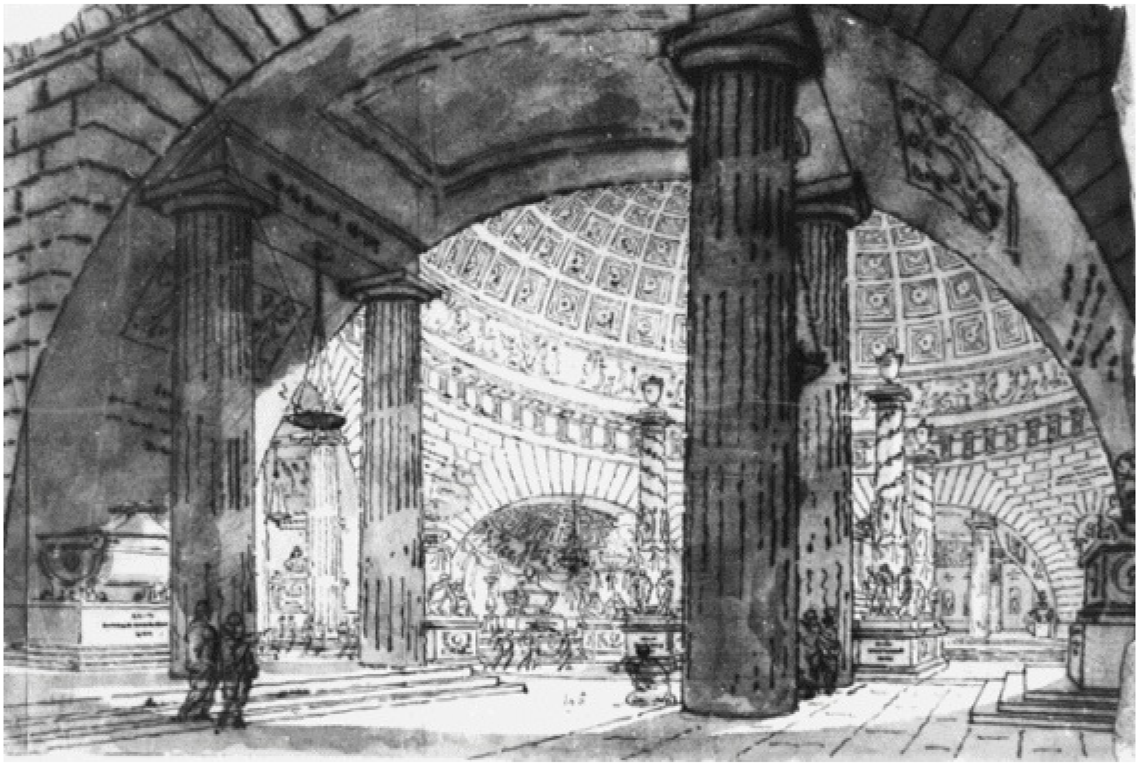
The interior of Gay's design presents a cosmological symbolism worthy of the original Pantheon on which it manifestly was modeled. Within the vast, spherical room painted azure blue and decorated with stars in their true positions, there was to be a central promenade with 24 winged figures representing the hours. Each statue holds a flower, which blooms at its designated hour to constitute a "botanical clock." Newton's complete works were to be engraved there on marble plaques. Hence, the building was to be a cenotaph to Newton, a museum of astronomy, an archive of Newton's thought, and a Deist temple to Nature.[25]

Deism in Funerary Architecture

The place of worship par excellence for the new Deist religion was not the church but rather the cemetery. From the 1740s onward, France in particular, and to a certain extent other European lands, underwent a reform movement in burial practices that considered the thousand-year-old custom of burying within parish churches and in adjacent or neighboring cemeteries both unhealthy for the living and disrespectful to both the living and the dead. As reformers proposed new cemeteries for locations outside of the city walls, architects began to offer an image of the new cemetery as a site of Deist worship, where humankind returns to the elements of the cosmos and where the dead return to the bosom of Nature.

Most of these designs were inspired in some manner by the Pantheon, either literally, as had been Gondoin's anatomy amphitheater, or more abstractly, in the manner of Boullée's Cenotaph to Newton. Among the most literal designs, which used a coffered, domed interior reminiscent of the Pantheon, were Pierre-Adrien Pâris's stage set for the Tomb of Agamemnon (Fig. 13.5); Jean-Louis Moreau's Grand Prix of 1785, with the cemetery's central chapel giving the appearance of a hemisphere surrounded by a ceremonial ring of columns on the exterior and featuring a coffered Pantheon-like dome with a double ceremonial ring of columns to the interior; and Giuseppe Borsato's Aula sepolcrale (funerary chapel, 1799). Perhaps the preeminent abstract project was Claude-Nicolas Ledoux's cemetery proposal for the industrial town of Chaux, the royal saltworks that he had designed in the Franche-Comté region of France. Similar to Boullée's Cenotaph to Newton, Ledoux's

cemetery project presented a spherical interior cavity that represented the cosmos, in this case with the sphere half buried in the ground. The engraving entitled “Elevation of the Cemetery of the Town of Chaux” does not show a building but, rather, a view of the planets. Similar in spirit to Ledoux’s cemetery project was an anonymous entry to the Grand Prix of 1799 for a public cemetery whereby the student imagined a domed central chapel replete with fully spherical interior space.[26]

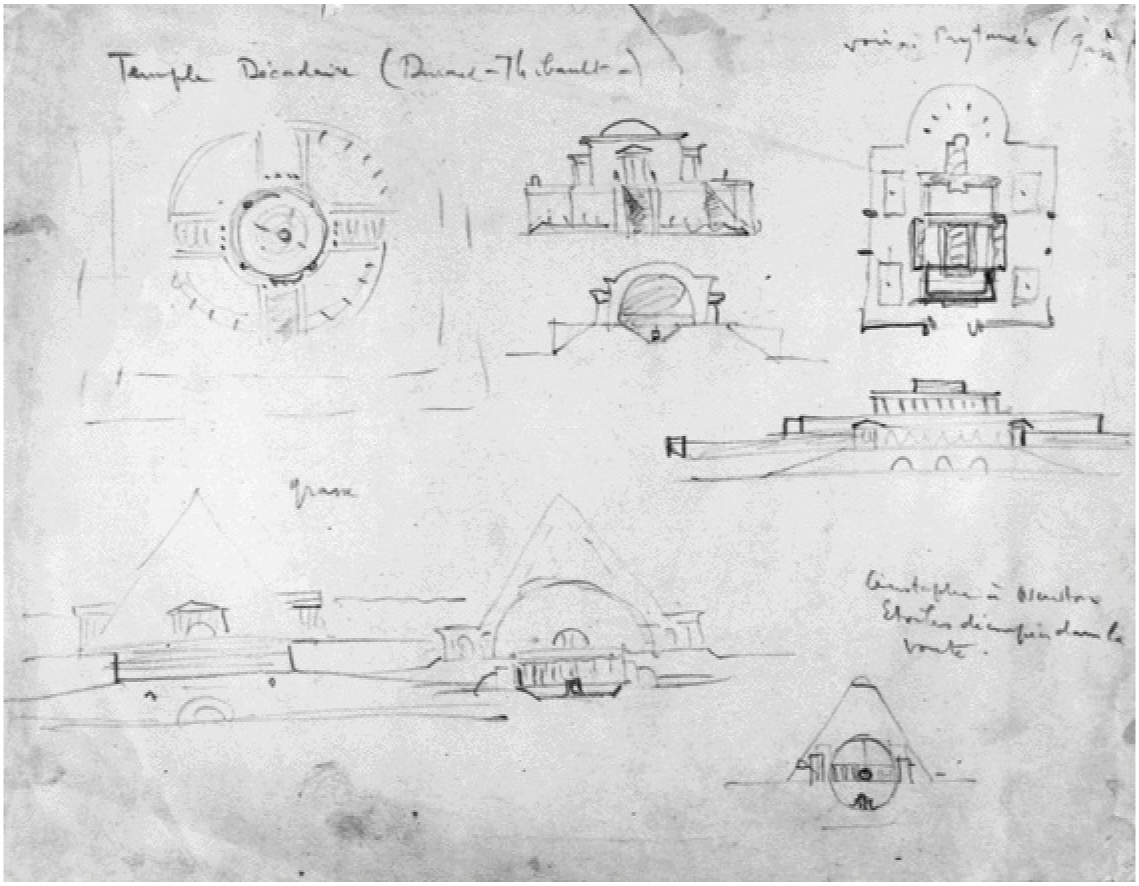


13.5. Pierre-Adrien Pâris, tomb of Agamemnon in a crypt, set design, ca. 1783. (Photo: © Bibliothèque municipale de Besançon)

One popular variant on this funerary theme was the cemetery with a central chapel in the form of a pyramid, which was a traditional shape for a mausoleum, yet hollow in the center with a Pantheon-like domed space to the interior. Boullée himself designed several such chapels, as did Pierre Fontaine in his second prize design for the Grand Prix of 1785. This format was repeated in several of the entries for the Grand Prix of 1799, as in Jean-Nicolas Jomard’s central pyramid with its star-studded dome, Louis-Sylvestre Gasse’s First Prize design, and Guignet’s Second Prize, the latter also with an interior dome covered with stars.

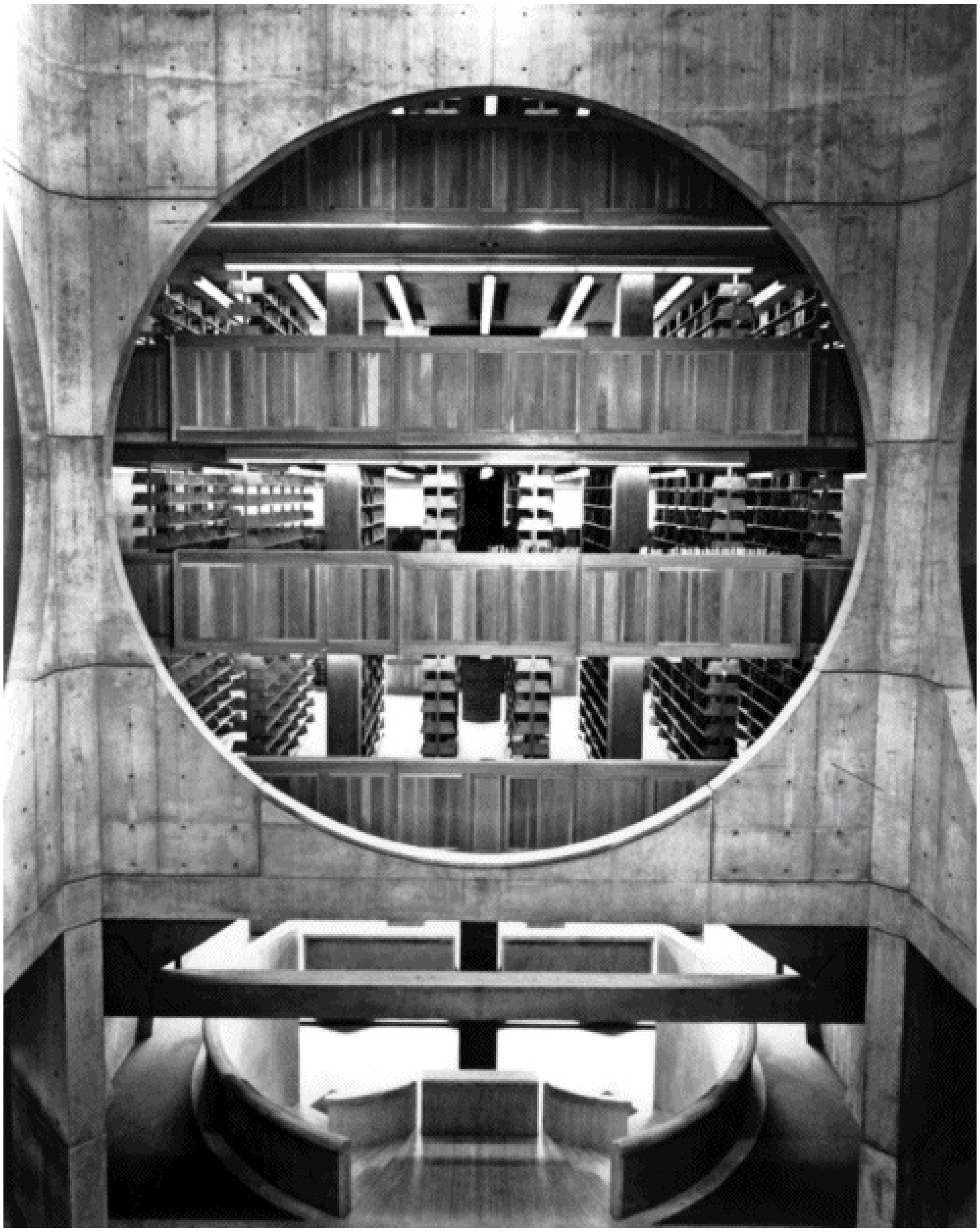
The prize-winning designs from the revolutionary period were published and hence widely transmitted to posterity, with extensive results in a variety of building types not limited to the cemetery. Four of these schemes reappear in a sketch from a course on architectural form, circa 1910, by the French Beaux-Arts architect Paul Philippe Cret, who was teaching in the United States at the University of Pennsylvania (Fig. 13.6). Three of the four revolutionary projects depicted here are symbolic building programs with no actual function, and all three have Pantheon-like domes. (The fourth project was for a school.) One was a Temple Décadaire (1802) by J.-N.-L. Durand and Jean-Thomas Thibault, a temple project with a star-filled dome typical of the French Revolution, which attempted to substitute domed temples dedicated either to Nature or to the Supreme Being to replace the Catholic church. The other two projects were the public cemetery Grand Prix of 1799 by Gasse and Gay’s Cenotaph to Newton of 1800. Although Cret himself did not design buildings that used the Pantheon as a model, he did invest his extensive civic architecture with metaphorical and symbolic

central atrium spaces that appropriately characterized the building type, a lesson that he taught his student Louis Kahn, who also worked for Cret's architectural office after graduation.



13.6. Paul Philippe Cret, sketch from course on architectural form, University of Pennsylvania, ca. 1910. (Photo: Paul P. Cret collection, The Architectural Archives, University of Pennsylvania)

More directly than Cret, Kahn applied the legacy of the Pantheon – "that wonderful building which satisfies the institutions of man"[27] – to much of his architecture, where the inwardly turned, centralized spaces evince both the lessons of Cret's teachings and of Kahn's own study of the Pantheon, first made possible when he won a fellowship in 1950 from the American Academy in Rome. These buildings include the Bath House (Trenton, 1955–1956), Erdman Hall Dormitories (Bryn Mawr College, 1960–1965), Philips Exeter Academy Library (1967–1972), National Assembly of Bangladesh (Dacca, 1962–1974), and Center for British Art and Studies (Yale University, New Haven, 1969–1974). Perhaps the National Assembly and the Exeter Library (Fig. 13.7) show the influence of the Pantheon most directly. The Philips Exeter Academy Library is built around a central space serving as the book delivery room. Each of the four defining walls of this square room is elevated off the floor and punctuated by a giant circle, which reveals rows of bookshelves beyond. One has the impression of a Pantheon of books. For the Assembly Chamber at Dacca, Kahn considered the Pantheon as a model to be followed abstractly, now rendered as a segmented melon vault placed over the octagonal chamber.[28]



13.7. Louis I. Kahn, Philips Exeter Academy Library, 1967–1972. (Photo: Louis I. Kahn Collection, University of Pennsylvania and the Pennsylvania Historical and Museum Commission)

Yet all of these buildings reflected Kahn's conviction that the Pantheon taught an architect the importance of creating a symbolic space that captured the essential nature of an institution, a theme to which Kahn repeatedly returned in his lectures and writings:

> Every city is made up of institutions. If you were to consider the making of a city you would have to consider the organization of the institutions. But you have got to review those institutions and really know what those institutions are. The institution of learning must have in its mind – must have in its sense – the realm of spaces which are good for learning, and not a program which says that you must have so many of this, or so many of that, but a realm of spaces which you feel is sympathetic to learning. So, therefore, you may go into a space which may be a Pantheon-like space. You would name it absolutely nothing – it would just be a good place to arrive in which you would say "school" – from which may come other spaces.[29]

Thus for Kahn, as for Cret, institutional buildings required a symbolic central space of appropriate character that set the tone for that particular institution and to which all of the building's other rooms and places were thematically related.[30]

For Kahn, the "Pantheon is really a world within a world" and in that sense the archetype of all architecture and the deep experience it can offer:

> The [Pantheon's] dome, the first real dome made, was conceived with a window to the sky.... And there is a demand [for] form saying nothing specific, no direction; that's what form says to you, feeling and philosophy.... The round building is something which is irrefutable as an expression of a world within a world.[31]

In the end, the connection between Kahn, Cret, Boullée, and the Pantheon becomes even more intertwined, because for the exhibition "Visionary Architects: Boullée, Ledoux, Lequeu," held in five American museums in 1967–1968, Kahn wrote a poem expressing his admiration for Boullée's projects, which includes the lines: "Boullée is/ ... / Thus Architecture is."[32] This line was an echo of Boullée's often repeated claim that in using the light and shadow of nature in his buildings, such as the Metropolitan Church project, the Cenotaph to Newton, and his funerary architecture, he was, in effect, emulating Divinity in the act of creating the world: "your art will make you the master of these means, such that you too will be entitled to say *fiat lux*," let there be light.[33]

The Rise of Democratic Government

One cannot overestimate the historical significance of the democratic revolutions that took place in the United States and then in France toward the end of the eighteenth century. Although there had been precedents of restrictive, representative government in the ancient Greek city-states, the ancient Roman Republic, the medieval Venetian Republic, and the British parliamentary system, the American and French Revolutions were literally epoch-making events in a world that since millennia had been dominated by monarchical rule, grounded in the principle of Divine Right, a notion challenged by Enlightenment authors such as Jean-Jacques Rousseau, who argued, for example, in *Le Contrat social* (The Social Contract, 1762) that the basis for society and hence for government was a compact among its citizens. This principle was clearly articulated in the Declaration of Independence of the Thirteen Colonies in Congress, July 4, 1776, whereby they became the 13 United States of America:

> We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty and the pursuit of Happiness. – That to secure these rights, Governments are instituted among Men, deriving their just powers from the consent of the governed.

Of course, the United States, like France with its new constitution established during its revolution, would have to pass through two succeeding centuries as each country learned to apply more thoroughly these principles to all of its citizens and to all of its inhabitants. Yet the very articulation

of these notions as the basis both for society and its government was unprecedented.

The leaders and supporters of these revolutions were themselves engaged in a human effort that, they believed, accorded with the very nature of the cosmic order. Hence, architects in both countries made recourse to the cosmic symbolism of the Pantheon for their government buildings. In Washington, DC, the American Capitol, though subject to the changing designs of successive architects, has always offered a version of a central rotunda on its skyline, originally modeled upon the Pantheon and then in the mid nineteenth century upon the successor domes to the Pantheon as found in St. Peter's in Rome and St. Paul's in London.[34] This was a symbolic space, which the architect Benjamin Latrobe in 1806 had dubbed the "Hall of the People."[35]

In Paris, before a new government headquarters could be designed ex novo, there was an outpouring of projects, often for the site of the rapidly demolished Bastille prison, a symbol of prerevolutionary tyranny. These proposals to house the legislative branch of the government placed the chamber for deliberations and votes either under a coffered dome modeled after the Pantheon, as in projects by Boullée and Jean-Baptiste Lahure, or under a cosmic dome showing the globe or filled with stars, in one case showing the constellations as they had appeared on the night of July 14, 1789, the day of the storming of the Bastille as signaling the onset of the revolution.[36] Under the Directory (1795–1799), the legislative hall for the Council of Five Hundred was retrofitted into previously existing royal palaces in Paris, first the Palais Bourbon and then the Luxembourg Palace, the latter serving successive revolutionary governments under the Consulate and the Empire. Each of these two assembly halls appropriated Gondoin's half-Pantheon anatomy theater as model.[37] Similarly, Benajmin Latrobe, between 1803 and 1812, arranged the meeting rooms in the U.S. Capitol for the House of Representatives and the Senate with variations of this half-Pantheon theme.[38]

The new democratic societies had not only new forms of government but also new social institutions for which appropriately symbolic edifices were needed. Not surprisingly, since the American and French Revolutions arose from prerevolutionary Enlightenment ideals, many of these new social forms had already been proposed in previous years. Enlightenment meant goodwill to all human beings across the globe in opposition to tribal exclusiveness. Thus, in 1785, the architect Antoine-Laurent-Thomas Vaudoyer had designed a House for a Cosmopolitan whose exterior presented a star-studded cosmic sphere elevated off the ground and surrounded by a Doric colonnade carrying an entablature covered with the signs of the zodiac.[39]

During the French Revolution, the notion of cosmopolitanism was readily conflated with that of equality. As J. P. L. Houël explained when proposing a monument to equality in the form of a globe floating above the clouds: "A globe ... is the most perfect emblem of equality."[40] This dramatic piece of public statuary followed upon comparable architectural designs, such as Jean-Jacques Lequeu's revolutionary-era projects for a Temple to Equality and for a Temple of the Earth.[41] The exterior of both projects – with an elevated sphere surrounded by a colonnade – was based on Vaudoyer's House for a Cosmopolitan. Each of Lequeu's edifices was to have an entrance covered by a carpenter's level, the common revolutionary symbol for equality. The Temple to the Earth actually presented a globe of the Earth as the outside surface. Unlike Vaudoyer's house, which had been furnished with rooms in the interior, Lequeu's two designs maintained a spherical cavity within. One featured a globe in the center, supported on symbolic carpenter's levels; another also had a globe, this time set upon a stubby columnar base, yet with the dome above punctured with holes to admit the

twinkling light of "stars," after the manner of Boullée's previous design for the Cenotaph to Newton. In an accompanying note to the Temple of the Earth, Lequeu referred to "eternal equality," leaving no doubt that he understood this principle to belong to the cosmic realm of natural law. The pediment over the entrance carries the inscription "To Supreme Wisdom," a revolutionary term for Divinity.[42] Either one or both of Lequeu's spherical temple projects were associated with the competition of the Year II (1794) for a Temple to Equality in which various contestants used some variation of the Pantheon, the most literal by Crozier with its coffered dome and central oculus.[43]

The democratic French government wished to honor its great citizens who had contributed the most to society. To this end, in 1791 it voted to convert the Neoclassical-style Church of Sainte-Geneviève, located on an eminence in Paris, near the Luxembourg Palace and gardens, into a Panthéon, named after the Roman Pantheon not only to designate its cosmic significance but also because the Roman edifice had been transformed to serve a similar function. As Susanna Pasquali explains in this volume, since the death of Raphael in 1520, artists had chosen to be buried in the Pantheon. Then, around 1780, busts of painters, sculptors, architects, and literati who had been inspired by Rome were placed in the Pantheon, thereby transforming it into a hallowed memorial for great men.[44] The French adapted this model and added other professions as well, dedicating the French Panthéon to the French benefactors of humanity.

This notion of *bienfaisance* had been a major value of the prerevolutionary Enlightenment era and had been subject to a variety of architectural projects, which had taken their inspiration from the monuments to British worthies in Westminster Abbey. As Voltaire had written, "I am convinced that the mere view of these glorious monuments has inspired more than one soul and has formed more than one great man."[45] Of particular significance to the history of the Pantheon in the modern era was the prerevolutionary notion of bestowing funerary honors in the cemetery according to merit rather than to wealth and social status. In 1765, just two months after the Parlement of Paris had ordered, albeit ineffectually, all cemeteries of the city closed by the end of the year, the Académie Royale d'Architecture sponsored a Prix d'émulation for a cenotaph to Henry IV, symbol of the exemplary ruler, where the "empty tomb of this prince would be surrounded by vast peripheral galleries for the tombs of the famous men who had made France illustrious." Then, in 1766, Louis-Jean Desprez won a Prix d'émulation for a major Parisian parish cemetery conceived in the same spirit. The young architect dedicated his burial ground to Voltaire not only as a great writer but also as the champion of funerary honors accorded to merit, an ideal fully applied to the design itself.

It is likely that the Pantheon-like interior chapels in cemetery designs from the Grand Prix of 1785, as well as those by Boullée discussed previously, had also been conceived according to this humanitarian and democratic ideal. The same is true of the cemetery projects from the Grand Prix of 1799; the program had called for an amphitheater where the merits of the deceased would be proclaimed as part of the ceremony honoring the worthy dead, whose monuments would encircle the central chapel. Recall that the various contestants had availed themselves of the Pantheon's form, either as an exterior dome or sphere or as an interior room, often covered with stars.[46]

The Public Museum

Both the public museum and the public library are institutions of the eighteenth-century Enlightenment,

and once again the Pantheon served as a model for the central space of many of the most important of these new institutions. In place of the private collections and private libraries, which were signs of the wealth and learning of their owners, usually royal or noble, we find the idea of a public museum of art and of a public library, each the pride of a city or country, and each important for the education of its citizenry. Even the cosmopolitanism of the Enlightenment figured centrally in the thought of the reformers who called for such public institutions. In this vein, the eminent art historian Aloys Hirt petitioned Prussian King Friedrich Wilhelm III in a memorandum of 1798:

> May I be permitted to say that it is below the dignity of [ancient art] to be displayed as an ornament. [These works] are a heritage for the whole of mankind.... Only by making them public and uniting them in display can they become the object of true study, and every result obtained from this is a new gain for the common good of mankind.[47]

The very concept of a museum of art was new. Traditionally, private collections were gatherings of works of art along with objects from natural history, often valued for their rare or curious forms, a collection named after the room in which it was often kept, *Kunstkammer* in German or *cabinet de curiosités* in French. Dating from the sixteenth century onward, these collections received a dual impetus from the newfound interest in classical antiquities, known as the Renaissance, and from the exploration of the far reaches of the globe by the new colonial powers, where exotic examples of vegetable, animal, and mineral specimens were gathered and sent back to Europe.

Yet even when paintings, for example, were kept together in the same room, they filled the wall, in the words of one scholar, “like pieces of a puzzle.” The idea of displaying art according to a temporal history of regional and national traditions only emerged in the second half of the eighteenth century, apparently inspired by “the advent of new taxonomies in the study of natural history (especially the binomial genus/species classifications of Linnaeus and Buffon).”[48] Indeed, the British Museum, which originated in 1753 by Act of Parliament, had its origins in the bequest of the private natural history collection and library of Sir Hans Sloane, to which were joined two collections of manuscripts, one already in the country’s possession since 1700. Opened to the public in 1759, the British Museum only began to purchase works of art, in the form of antiquities, in 1772. Housed originally in a seventeenth-century mansion, the museum received its own new building, designed to represent a public museum rather than a private residence, according to a design of 1832 by Sir Robert Smirke. Between 1854 and 1857, Smirke’s younger brother Sydney, who had succeeded him as the museum’s architect, constructed in the building’s courtyard a domed circular Reading Room for the British Museum Library, which has been considered a progeny of the Roman Pantheon.[49]

In France, toward the middle of the eighteenth century, the idea spread that the royal collection of art was actually a national treasure, which had to be shared with the people. Between 1750 and 1779, part of the king’s collection was placed on public display in Paris in the east wing of the Luxembourg Palace. During this time, it was widely believed that the Luxembourg Gallery was only a temporary measure before a grander museum would be opened in the Louvre Palace.[50] In the same year that the Luxembourg Gallery was closed, a portrait of the king’s director general of royal buildings, Count d’Angiviller, was displayed at the Salon, which showed the count at a table with the floor plan of the Grand Gallery of the Louvre, thereby indicating to the public that there was a project to create an even more extensive public museum in the king’s palace. “I know that His Majesty,” reported the

count to the Académie Royale d'Architecture in 1785, "personally wants nothing short of perfection in the design of [this] national monument."[51]

Always attentive to the latest social and cultural developments, the Académie Royale d'Architecture sponsored design competitions not only for cemeteries but also for museums at critical moments in the history of such institutions. Thus, in 1753, shortly after the opening of the Luxembourg Gallery, it assigned to its students for the Grand Prix the problem of a gallery for the display of art, a type of room that conceivably would belong to a royal palace. The Grand Prix was awarded to Louis-François Trouard, who placed a coffered dome, as a miniature reminiscence of the Pantheon, at the center of the design.[52] The subject for the Grand Prix in 1754 was a "salon" for the three arts of painting, sculpture, and architecture. Later, just as the Luxembourg Gallery closed, the Grand Prix of 1779 had as its subject a museum, which, in addition to rooms for the display of painting, sculpture, and architecture, would also house the sciences (notably geography), with their library, and natural history.[53] The four winning designs each had a modestly sized Pantheon-like rotunda at the center of the edifice.[54] In the designs of 1753 and 1779, this central Pantheon-like space was less a functional room than a temple dedicated to the noble concepts of art, culture, and science. This symbolic use of the Pantheon was codified in J.-N.-L. Durand's *Précis des leçons d'architecture données à l'École polytechnique* (1802–1805),[55] which circulated widely throughout European and later American schools of architecture and was to echo throughout the subsequent history of museum design, all the way into the twentieth century with John Russell Pope's National Gallery of Art (1937) in Washington, DC.

In 1783, after the Treaty of Paris, which recognized the new American nation and settled peace between Great Britain and France, the French king promised a considerable sum of money for the new museum project in the Grand Gallery of the Louvre.[56] At this time, Boullée offered his own design for a museum, which gave much greater prominence to the central rotunda than had any of the earlier student projects for the Grand Prix of 1753 and of 1779 or the prototypical museum based on these Grand Prix designs that Durand subsequently would publish in his *Précis*. Anticipating the Cenotaph to Newton of 1784, Boullée's museum, with limited space for exhibitions, was primarily a giant Deist temple to Nature where, under the central dome, a pyramid of steps rose in the guise of a metaphorical Mount Parnassus, crowned with a "Temple of Fame" made of an honorific ring of columns carrying statues of the great men of France carved by France's most eminent artists.[57] The ceremonial and symbolic aspect of Boullée's domed interior of the museum project was echoed in Charles Percier's Grand Prix of 1786, whose subject was a modification of the Grand Prix of 1753 now redefined as a building to house the three academies of painting and sculpture, architecture, and letters. Whereas the nominal function of the central rotunda, with its Pantheon-like coffering and oculus, was an auditorium, its scale revealed its essentially symbolic character. In elevation, Percier's edifice strongly resembled Boullée's museum, as well as aspects of Boullée's public library project of circa 1784, thereby further suggesting the influence of the older architect's work.[58]

Both Boullée's museum project and Percier's Grand Prix of 1786 for the assembled academies appear to have exerted a decisive influence on the greatest Pantheon-like museum of the entire modern period, Karl Friedrich Schinkel's Altes (Old) Museum (Fig. 13.8), so-called because a Neues (New) Museum was later built on the same Museum Island in Berlin.[59] The essentially ceremonial and symbolic nature of Schinkel's entrance porch and central rotunda was confirmed by

Aloys Hirt's objections to their nonutilitarian character.[60] Shinkel's facade, with its broad sweep of columns and its deep central entrance loggia enriched with a second row of columns, appears as a variation of Percier's front facade for his academy design for the Grand Prix of 1786, which, in turn, is a variation on the facade of Boullée's public library project of circa 1784. As Nikolaus Pevsner has observed, "the eighteen fluted ionic columns between the square angle piers are the noblest introduction to a temple of art."[61] As for the coffered rotunda of the Altes Museum, Shinkel, in his rebuttal to Hirt's criticism, explained that he considered this "beautiful and sublime room" to be a "sanctuary," thereby emphasizing its symbolic, temple-like character:

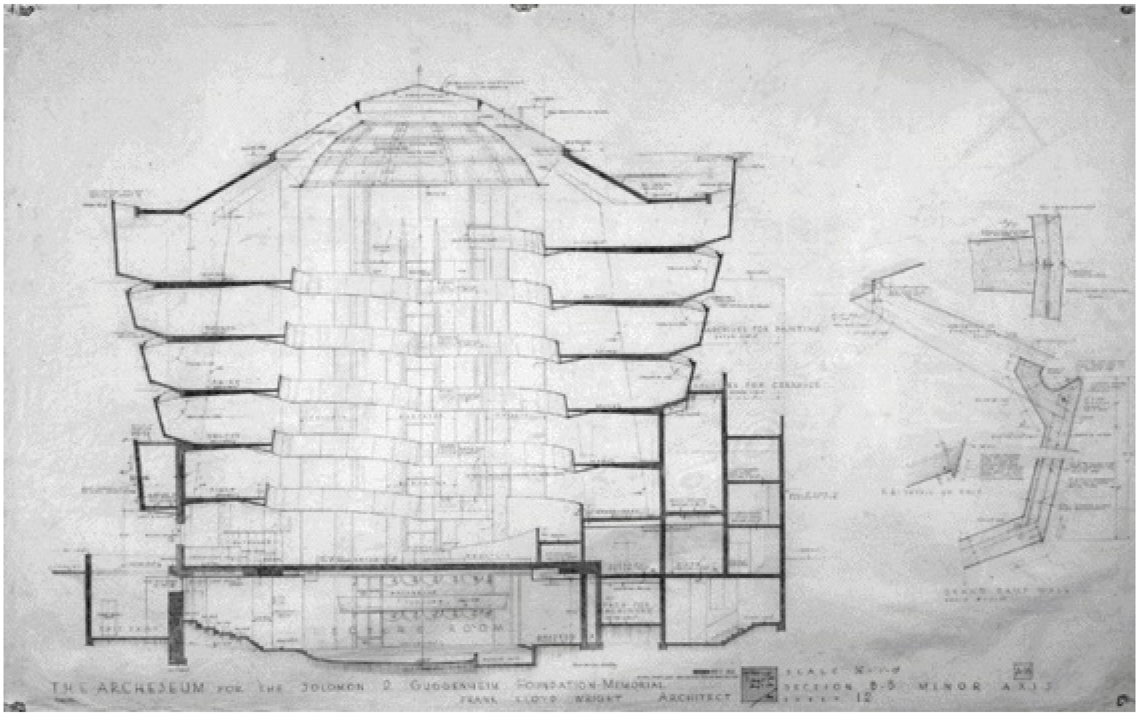
> Finally, so mighty a building as the Museum will certainly be, must have a worthy center. This must be the sanctuary, where the most precious objects are located.[62]

13.8. Karl Friedrich Schinkel, Altes Museum, Berlin, 1824–1830. (Photo: Erich Lessing/Art Resource, NY)

Schinkel's commitment to the sanctuary-like quality of the rotunda prompted him, during construction, not to open the two side doors that had been envisaged on the plan, thereby "endeavor[ing] to isolate the 'Pantheon' more from the rest of the building."[63] Schinkel's evocation of the Pantheon was direct, not only through the coffering of the dome and the oculus but also in the size of the central rotunda: one-half the Pantheon itself.[64]

One can only speculate as to the effect that the publication of Percier's Grand Prix of 1786 might have had on Schinkel, as well as the unpublished museum and public library projects by Boullée, drawings that Schinkel's teacher and idol Friedrich Gilly might have seen during his trip through Europe in 1797–1799, with a visit to Paris that had deep repercussions on the subsequent development of German Neoclassical architecture.[65] Schinkel's Altes Museum was, in part, designed to rival Leo von Klenze's Glyptothek (1815–1830) in Munich so that the Prussians could have an art museum at least the equal to its much-admired Bavarian predecessor. The most important room in the Glyptothek was the coffered Pantheon-like rotunda, whose decoration and art, as von Klenze explained, was to "reflect the most beautiful era of the ancient world."[66]

Frank Lloyd Wright used the Pantheon as the prototype for a museum when he designed the Solomon R. Guggenheim Museum in New York to house a collection of "non-objective art" (Fig. 13.9). Conceived in 1944 but not constructed until after World War II in 1956–1959, the centralized exhibition space with skylight and spiraling ramp that provided uninterrupted passage throughout the entire gallery declared by means of its architecture that this was an entirely new and self-sufficient world of art. We have seen that Wright considered this edifice to be his Pantheon, a remark made to the supervising architect William H. Short.[67] Yet credit should also be given to its patron in the person of Hilla Rebay, curator of New York's Museum of Non-Objective Painting and of the Solomon R. Guggenheim Foundation, which sponsored the new museum by Wright.[68] Rebay not only selected Wright as the architect but also encouraged him to abandon his initial idea about a horizontal design in favor of a vertically oriented building that would impart a sense of spirituality. Asking Wright to abandon his interest in – "this crawling in wide extensions" – she encouraged the architect to combine horizontal and vertical, "a sensitiveness, that will not only spread horizontally, but also vertically, up to the infinite infinity of space."[69] Rebay, explains Neil Levine, "elaborated on her concept of a sanctuary for the spirit, imploring Wright to embody its 'cosmic breath' in his design: 'With infinity and sacred depth create the dome of spirit: expression of the cosmic breath itself – bring light to light!'"[70]



13.9. Frank Lloyd Wright, "Archeseum," September 1956, Solomon R. Guggenheim Museum, New York, 1943–1959. (Photo: © 2009 The Frank Lloyd Wright Foundation, Scottsdale AZ/Art Resource, NY/Artists Rights Society [ARS], NY)

In abandoning his initial impulse for a horizontal project in favor of a vertical scheme, Wright envisaged an inverted hollow "ziggarut" with a spiraling ramp around a grand central space capped with a dome.[71] Through most of the development of the project, Wright's "Dome," as he called it,[72] evoked the Pantheon, as shown in the first model, which was presented in 1944–1945, and in subsequent renditions where he envisaged a shallow dome of translucent glass comprised of two layers of concentric rings of Pyrex glass tubes with an intermediary frame of steel tubes arranged in three stacked rings of concentric circles, culminating in a glazed oculus set within a compression ring.[73] As Neil Levine has explained, after a trip to Rome in August 1956, Wright strengthened his allusion to the Pantheon with his penultimate design, which is illustrated here, where he now proposed "a coffered dome of sandblasted glass" hung from a concrete framework.[74] Yet Wright did not make explicit reference to the Pantheon in the final design, which abandoned the hung dome in favor of a total integration of form, space, structure, and decorative effect in the manner of an "organic architecture" that he had achieved earlier in Unity Temple and that he had described as his goal in his account of that building in his autobiography.[75]

Like the architect of the Pantheon, who subtly manipulated the shape of the coffers in the dome such that they appear to expand upward and outward, unbounded by the dome's inner surface, as if carried into the skies by the oculus of light that is isolated visually from the grid of the dome by a wide band of smooth, unbroken surface,[76] Wright achieved a comparable effect in the Guggenheim Museum with his spiraling ramp and central skylight. Wright's ramp seems to spiral upward, cantilevered into space off the recessed vertical structural piers that, nonetheless, come forward at the top of the rotunda to join together in rounded arches that are dramatically withdrawn from the middle of the central skylight, which, like the oculus of the Pantheon, presents a floating circular disk of hovering sky.

James Johnson Sweeney, appointed director of the Guggenheim Museum in October, 1952,[77] "pointed to the '"great-room" character' of Wright's design" shortly after the opening, explains Levine, as "'the most individual and gratifying feature of the building as an art museum'" and remarked that "'its effect on the public is immediately noticeable.'"[78] The term "great room" readily suggests itself to the visitor; yet it might have come from Wright himself, who had spoken in his autobiography of the sanctuary in Unity Temple as a "Noble ROOM."[79] We have seen that Louis Kahn was to express a similar sentiment about the Pantheon as a world unto itself, so appropriate for conveying the essence of a great cultural institution.

The Public Library

One of the most memorable as well as characteristic undertakings of the Enlightenment was the all-encompassing intellectual effort to chart the entire expanse of knowledge in an encyclopedia, of which there were several in the eighteenth century: the *Lexicon technicum* (1704) by John Harris, the *Cyclopedia* (1728) by Ephraim Chambers, the *Encyclopedia Britannica,* first published in 1771 and subsequently expanded, and "the most renowned and influential of encyclopedias, the French *Encyclopédie*, completed in 1772" under the direction of Denis Diderot and Jean le Rond d'Alembert. This century, in effect, gave birth to the "modern encyclopedia."[80] In many respects, the enterprise of an encyclopedia was the intellectual equivalent to the other universalist aspects of the Enlightenment studied previously: Deism and Unitarianism in religion, cosmopolitanism in outlook, democracy in government, and the museum as a comprehensive collection of the arts. Echoing the *Encyclopédie*, Boullée explained the preeminent status of the national library in his memorandum of 1785: "The most precious monument for a nation is, without a doubt, that which houses all of acquired knowledge."[81] Thus, the national library, open to its citizens, takes its place within the pantheon of Enlightenment building programs and, accordingly, would utilize the Pantheon as its model.

As a comprehensive history of the library has affirmed, "the modern scholarly library is the creation of the Enlightenment." In German-speaking lands, an extensive library became an important new room in the palaces of local rulers, its collection often open to the public. Likewise, German university libraries acquired both increased stature and fame, unknown to their seventeenth-century counterparts.[82]

In France, focus was placed on the transformation of the Royal Library into a national library with public access. Such a high cultural endeavor required a comparably inspired design from the architect. "If there is one subject that should please an architect," mused Boullée, "and at the same time inspire his genius, it is the project of a public library."[83] Commissioned by the government to study the possibility of constructing a new national library near the Place Vendôme in Paris, Boullée offered a design largely inspired by the cruciform plans for a museum of the Grand Prix of 1779 and centered around a modest Pantheon-like central dome. Too costly, the project was abandoned in favor of transforming the courtyard of the current Royal Library into a new reading room, which Boullée designed as what might be considered a longitudinal Pantheon, a top-lit coffered barrel vault placed over an amphitheater of books. Constrained, then, by budget and site, the architect took the concept of the cosmic symbolism of the Pantheon and adapted it to a basilica format. Yet Boullée left no doubt

as to the cosmic effect that he sought there: “this basilica will offer the grandest and most striking image of any existing thing.”[84] One of several studies for the main facade featured two atlantes, or giants, carrying a celestial sphere.

Boullée’s intentions for the public library were not lost on the young architects and students of architecture who proposed major library projects in the succeeding years. For a Prix d’émulation in 1787, Jean-Nicolas Sobre designed a public library whose major room was covered by an immense Pantheon-like dome, painted with the signs of the zodiac and opened in the middle with an oculus. The walls of this temple of learning were to be lined with books, and an amphitheater of steps within the center of the room was to serve as a classroom for public courses. This central rotunda was surrounded by a double ring of spaces in the shape of two concentric squares: the inner ring containing the statues of great men, the outer ring serving to house printed books and manuscripts. To all four sides of this central complex of concentric rooms were barrel-vaulted spaces with coffers and skylights after the manner of Boullée’s own second library project.[85]

One variant on this theme can be found in Alexandre-Jean-Baptiste Guy de Gisors’s project of the Year VIII (1799–1800) to complete the unfinished Church of the Madeleine, which visually terminated the street leading from the north axis of the Place de la Concorde, as the National Library. Gisors provided three successive amphitheaters of books, each under a domed ceiling with central oculus. Gisors’s choice of this unfinished monument for the National Library was pregnant with meaning. It corresponded axially to the Palais Bourbon on the other side of the Seine, a building, as we have seen, that had housed the national legislature during the Directorate and which just now in 1799 was being transformed into the National Archives. As for the square itself, originally constructed to honor Louis XV, whose equestrian statue had graced the center, it was rebaptized during the French Revolution as Place de la Révolution and the guillotine was erected in place of the king’s statue. After the Terror, the square was renamed Place de la Concorde, as a civic gesture of domestic reconciliation between warring factions. Had Gisors’s library project been realized, then each of the two major civic buildings closing the two sides of the axis would have presented Pantheon-inspired domed spaces as the major room.

All of these library projects with their cosmic theme came to fruition not in France but in the United States, in Thomas Jefferson’s design for the University of Virginia. Education, for Jefferson, was central to the success of the new American republic. “I have looked on our present state of liberty,” he opined in 1805, “as a short-lived possession unless the mass of the people could be informed to a certain degree.” In 1821, while reflecting on his efforts on behalf of his 1779 Bill for the Commonwealth of Virginia on the “More General Diffusion of Knowledge,” Jefferson wrote, “Nobody can doubt my zeal for the general instruction of the people.” This law envisaged three tiers of public education: primary school, district colleges, and a state university. “For the collegiate and university levels,” as scholars have explained, “it provided a selection process for educating the best and brightest students ‘without regard to wealth, birth or other accidental condition or circumstance.’”[86] The University of Virginia was created as the capstone of this universal and democratic system of education. The Rotunda (Fig. 13.10), designed by Jefferson as a half-scale version of the Pantheon, became the fitting embodiment of these principles.

13.10. Thomas Jefferson, Rotunda, University of Virginia, Charlottesville, 1818–1828. (Photo: Courtesy Thomas Schumacher)

Yet the very existence of the Rotunda, let alone its form and purpose, emerged only by stages in Jefferson's mind. His initial design for the university lacked a focal building, which was proposed to him by the architect Benjamin Latrobe, who in a letter and sketch of July 24, 1817, suggested a grand central auditorium building, which he drew in the manner of the Pantheon. Latrobe appears to have been in close contact with the French émigré Joseph Ramée, who at the time was designing Union College in Schenectady, New York, with a Pantheon-inspired central building for his new campus.[87]

In Latrobe's project, the ground floor of his Pantheon-like edifice was to house a semicircular lecture room; above, a circular lecture hall underneath the dome.[88] The idea of a monumental point of focus for the campus greatly appealed to Jefferson, who modified Latrobe's sketch by scaling it to one-half the size of the Pantheon and by providing enough similar details so as to ensure a ready resemblance to the ancient model. Of course, the Rotunda was built of local red brick with white wooden trim, its dome of laminated wood, thereby making it both visually and structurally an American variant on the Roman concrete prototype.

This difference in materials had major implications for the design of the front porch in its volumetric relationship to the rear cylinder, which extended outward to the sides of the porch, and to the dome above. Since the exterior wall of Jefferson's Rotunda lacked the considerable thickness of the original, which had made the outside cylinder of the Pantheon much broader than the interior volume, Jefferson's entire edifice presented a more slender profile. Thus, Jefferson was obliged to change the temple front of its porch from eight to six columns in order to retain a suitable relationship for all of the major architectural features.

With respect to function, instead of placing a lecture hall under the dome as Latrobe had suggested, Jefferson decided to house the university's library there. It was a fitting symbol of the nature of the university, for the cosmic imagery of the Pantheon confirmed the Enlightenment notion, as Boullée had

expressed it, that the library houses humankind's collective understanding of the universe. To make this message explicit, Jefferson planned to "paint the dome sky blue and set gilt stars and planets against it; there would be a seat for an operator, and the stars could be changed to conform to their varying positions."[89] In other words, Jefferson was proposing to realize a variation of the planetarium that Boullée had proposed in his Cenotaph to Newton of 1784 and to combine it with Boullée's holistic library concept of 1784–1785. The similarities between Boullée's projects and Jefferson's Rotunda should not surprise because Jefferson had served as American minister to France in the period 1784–1789 and had close contact with the architects of the Académie Royale d'Architecture during the time of his Paris sojourn.

Had Jefferson ever wished to render the interior of his Rotunda as a single volume, thereby approximating the effect of the Pantheon? Stanford White, of the eminent American Beaux-Arts architectural firm McKim, Meade and White, certainly believed so, arguing that only circumstances beyond Jefferson's control had obliged him to place two other floors with rooms in the Rotunda. White voiced his opinion while preparing to restore the Rotunda after his firm had been engaged by the University of Virginia in the aftermath of the fire of October 1895, which had nearly destroyed Jefferson's masterpiece. In the previous year, White and Charles Follen McKim, who were engaged in planning a new campus for New York University's University Heights campus in the Bronx and Columbia University in Manhattan, each had designed a Pantheon-like central library for his respective campus, probably inspired by Jefferson's Rotunda. Now the firm had the opportunity to work on the original itself, which was repaired in the form that White imagined that Jefferson would have intended, with one large interior domed room. For three-quarters of a century, the Rotunda's interior stood as a closer approximation to the Pantheon than it ever had been, before it was restored in 1973–1976 to its original, internal configuration.[90]

The Pantheon's legacy in library design of the twentieth century emerges most forcefully in Erik Gunnar Asplund's Stockholm Public Library, which underwent a long gestation with several designs between circa 1920 and its opening in 1928 (Fig. 13.11). The Pantheon was a repeated point of reference in Asplund's architecture, which, before the architect's conversion to the International Style, participated in the Neoclassical revival that was popular in Scandinavian countries in the early decades of the twentieth century. In his first complete project for the public library, dating from 1921, Asplund envisaged a central amphitheater of books under a Pantheon-like dome, where in place of recessed coffers he would have substituted deep skylights.[91] Both front and rear facades would reveal this central domed chamber. In the final, built design, Asplund transformed the literal reference to the Pantheon into an abstract one, now utilizing a tall cylinder in place of the dome, albeit paving the floor with a pattern reminiscent of the Pantheon's marble pattern.[92]

13.11. Gunnar Asplund, public library, Stockholm, 1920–1928. (Photo: Courtesy Johan Mårtelius)

Throughout his architecture, Asplund explored the metaphysical qualities of space and light. Reflecting on the symbolic staircase of Sigurd Lewerentz's "back-lit Jacob's ladder to the cremation plateau" in the domed room of the cemetery exhibit at the 1923 Göteborg Exhibition, Asplund asked rhetorically, "Suppose there had been no building and just an open sky at the end of the staircase?"[93] This thought helps us to understand Asplund's attention to light and space in three of his edifices where the Pantheon played an important role. In the Woodland Chapel of the South Stockholm Cemetery (1920), the architect created a Pantheon-like dome with mystical indirect light entering through a glazed central skylight. Asplund explained that the dome "was intended to hover weightlessly."[94] In the Hall of Fame of his Skandia Cinema (Stockholm, 1922–1923), he combined cove lighting along the walls of the cylindrical space with an unlit domed vault, glimpsed through the central oculus in a flat ceiling. Looking upward into the dark blue surface with its suggestion of the limitless space of a domed vault, the eye and mind become lost in a dark infinity, what Asplund termed "a dark nothingness."[95]

The young Alvar Aalto, who soon would become the leading Finnish architect of his generation, perceptively noted the psychological and even spiritual aspects of Asplund's work. Having just met Asplund in the Skandia Cinema, Aalto observed:

> I had the impression that this was an architecture where ordinary systems hadn't served as parameters. Here the point of departure was man, with all the innumerable nuances of his emotional life, and nature.[96]

Like Boullée's Cenotaph to Newton and his library projects, Asplund's Stockholm Public Library

was “a metaphor for the mind.”[97]

In effect, Asplund’s library was his own Jacob’s Ladder. In both the first and final scheme, a ceremonial staircase provides ascent into the central, book-lined library hall (Fig. 13.12).[98] The initial design presents an ascent focused on three dark doors at the rear of the hall on each level of the amphitheater of books, which seem to suggest the dark recesses of the mind. In the final design, these doors were replaced by a single square, interior window from an annular corridor. Considered in conjunction with the ring of much larger rectangular windows that only come into view as one proceeds farther up the symbolic staircase leading into the central hall of books, this diminutive window obviously has no significant effect on the level of useful illumination but, rather, serves suggestively as a symbolic third eye into the mind.

13.12. Gunnar Asplund, public library, Stockholm, view into the reading room. (Photo: Courtesy

Stadsbiblioteket, Stockholm)

Asplund was very sensitive to the effects of contrast in scale. Writing about the oversized details in the main room of the Skandia Cinema, he explained that "a large motif always gives the impression of nearness, i.e., reduces the size of the room."[99] Conversely, we can extrapolate to say that Asplund understood that the small scale of the square window in the Stockholm Public Library, juxtaposed with the large rectangular, sun-filled openings, would make it seem not only like a miniature but also as if it were receding deeply into space, the perfect metaphor of a journey into the mind.[100]

The invitation to such a mental or spiritual journey is reinforced throughout the building. In both the preliminary scheme and the executed building, this processional ascent upward is preceded with a floor mosaic inscribed with the ancient Greek phrase "Know Thyself," an image that Asplund had sketched during a visit in 1914 to the Terme Museum in Rome.[101] Figures of Adam and Eve, each with an apple in hand, form the door handles of the large glass entrance, thereby obliging each visitor literally to take the matter in hand. Whereas the Enlightenment, with its optimistic view of the progress of human knowledge, provided us with the first projects and realizations of the public library, in the aftermath of World War I Asplund suggests that a more sober self-assessment of human potentialities and proclivities would be in order.

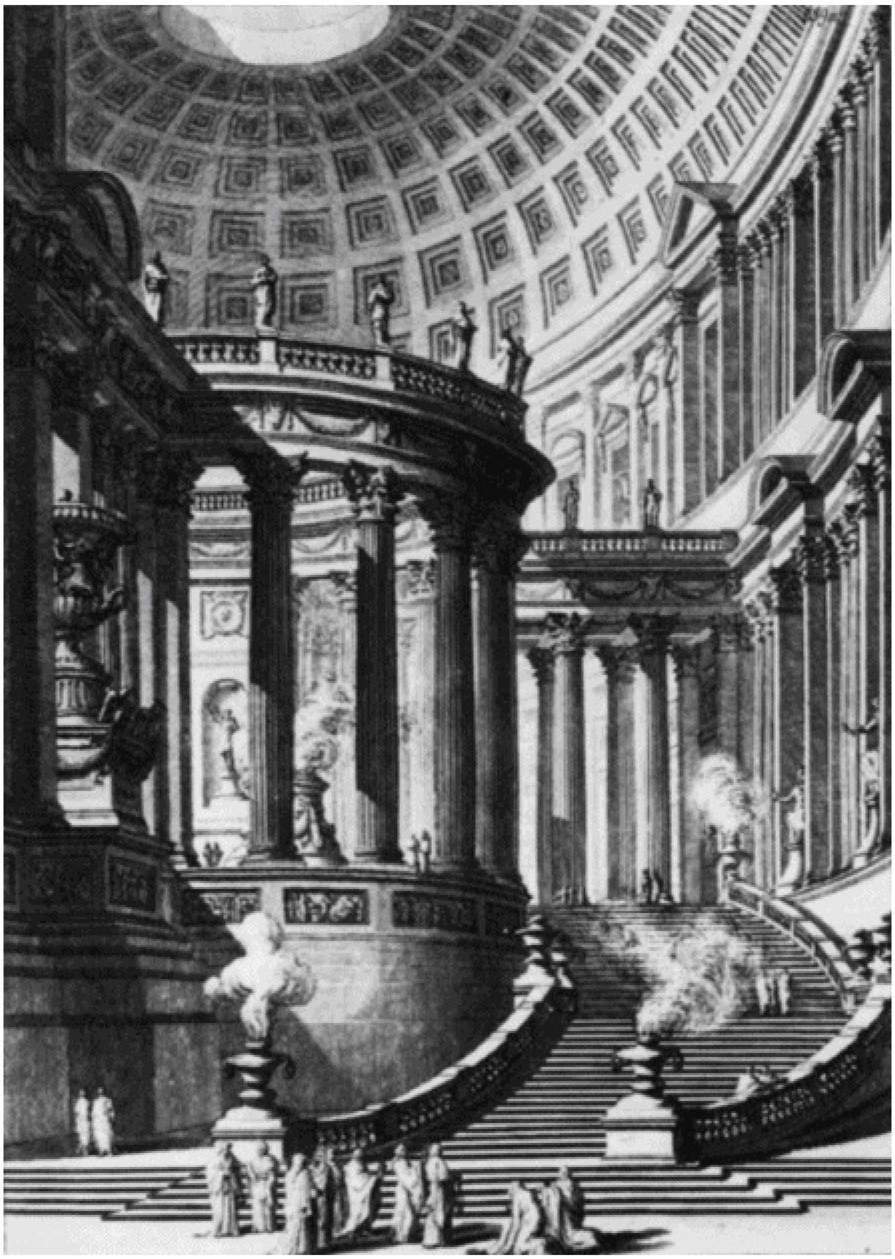
There was no need, of course, to await World War I to offer a more skeptical view of the human condition. On the back of his drawing for the Temple of the Earth, which he had dedicated to the concept of human equality, Jean-Jacques Lequeu had sarcastically proposed to the minister of the interior that the edifice be constructed as the central chapel at the new Cemetery of Père Lachaise in Paris, recently opened in 1804, "because it is certainly useless to the French, who are enemies of equality, and who will never get along with their fellow human beings."[102] Both Asplund's cautious skepticism and Lequeu's cynical black humor serve as potent reminders that the idealism of the architecture considered in this chapter was an appeal to the better aspects of human nature. The final section on Neoclassicism and the sublime will present us with a further encounter with good and evil with respect to the theme of the Pantheon.

Neoclassicism and the Sublime

The buildings discussed in this chapter, which took the Pantheon as their model, partook of a new stylistic movement born in the mid eighteenth century and later revived in the twentieth, known as Neoclassicism. Many also were invested with the attributes of an aesthetic category of major importance to the eighteenth century known as "the sublime."[103] Both the style and the aesthetic were often related, sharing common psychological and, at times, even spiritual outlooks.

Neoclassicism, as a style, favored pure prismatic volumes, surfaces either left plain or adorned with identically repetitious motifs, and freestanding columns that were evenly spaced in long, uninterrupted rows. Simple forms with repetitive features, explained Boullée, make the strongest impression on our minds and present the most harmonious forms.[104] To that end, the architects who adapted the interior of the Pantheon to their Neoclassical designs tended to favor the dome rather than the highly articulated lower cylinder with its niches and pairs of columns at different scales.

With respect to colonnades, Boullée found a source of inspiration in the porch of the Pantheon. Lamenting that "our churches, far from being surrounded by colonnades, are formed by walls with pier buttresses that resemble walls of fortifications," he then proceeded to praise the Pantheon's porch, universally admired for "the noble columns and proportions of its architecture." "Is it not extraordinary," mused Boullée, "that an example so widely admired has not yet been imitated in our capital?"[105] The Neoclassical buildings that adapted the Pantheon's dome were often, as we have seen, graced with colonnades on the facade or in the interior. When columns were employed in conjunction with the dome, they were almost always a single or double ring that either supported the dome or were placed underneath as a freestanding sanctuary. The model for this latter arrangement was probably Giovanni Baptista Piranesi's engraving of the Pantheon with a so-called Temple of Vesta in the interior (Fig. 13.13).



13.13. Giovanni Baptista Piranesi, imaginary ancient Temple of Vesta, 1743.

For Neoclassical architects, it was important not to copy the Pantheon too closely. Hence, in 1779 a commission of the Académie Royale d'Architecture criticized the design for a palace to serve as a papal conclave by one of its Grand Prix winners sojourning at the Académie de France in Rome

precisely for this fault: “The idea of the circular room in the center ... is absolutely the same as the one that, in his project for a palace of justice presented last year, constituted the main meeting room of that building, and for which he was criticized for having imitated too closely the Pantheon.”[106] The most extreme cases of abstraction occurred when either the dome without coffers or a spherical cavity was employed, often covered with stars as an expression of a Deist wonder about the magnificence of Nature.

This Deist attitude also informed many of the projects that engaged the sublime. As explained in the popular treatise published by Edmund Burke in 1757 and soon translated into French, *A Philosophical Enquiry into the Origin of Our Ideas of the Sublime and Beautiful,* the sublime in architecture required “magnitude in building”: “To the sublime in building, greatness of dimension seems requisite; for on a few parts, and those small, the imagination cannot rise to any idea of infinity.” Although Burke did not mention the Pantheon, he probably had this edifice in mind when he observed that one way to create the effect of infinity in architecture was through the use of a dome, because the eye would run uninterruptedly over the surface, thereby presenting an unending image of grandeur.[107] Boullée further developed this idea, which he applied to the form of the sphere, that he had used in the Cenotaph to Newton:

> The other advantages of a spherical body are to develop under our eyes the largest surface, which makes it majestic; to have the simplest form, whose beauty issues from the lack of interruption to the surface; and to join these qualities with that of grace, because the contour is as smooth and as flowing as possible.[108]

The sublime joined the Deist worship of Nature through what Burke termed “magnificence,” as illustrated through reference to the starry sky, a feature that, as we have seen, was popular with Neoclassical architects adapting the Pantheon for their buildings: “The starry heaven, though it occurs so very frequently to our view, never fails to excite an idea of grandeur.”[109]

Thus, the Neoclassical response to the grandeur of the Pantheon’s dome, and by extension to its potentially spherical interior, was marked by a psychological and even spiritual transport. “Let any one reflect,” suggested Joseph Addison in 1712, “on the disposition of mind he finds in himself, at his first entrance into the Pantheon at Rome, and how his imagination is filled with something great and amazing.”[110] To some commentators on the sublime, the effect was physical: “Every person upon seeing a grand object,” explained John Baillie in *An Essay on the Sublime* (1747), “is affected with something which as it were extends his very being, and expands it to a kind of immensity.”[111] Boullée exploited this sensation in the interior of his Cenotaph to Newton through recourse to the psychological effects of standing within a vast, dark, star-lit spherical cavity: With curved surfaces at every side and with the tomb as the sole point of focus, the visitor, as Boullée explains, would feel frozen at the center, unable to move:

> He is obliged, as if [held] by a thousand forces, to remain where he is at the center.... Isolated on all sides, his sight can only be directed toward the immensity of the sky.[112]

Through this Neoclassical application of the sublime, the visitor to Newton’s tomb would learn about

“the expanse of [Newton’s] enlightenment and the sublimity of his genius”[113] by having his or her “mind elevated to the contemplation of the Creator and to experience celestial feelings.”[114] The resultant feeling would be such that “the spectator would find himself transported into the sky as if by enchantment and carried on the clouds into the immensity of space.”[115]

Some manner of these feelings of transport and enchantment recur in various later buildings, especially in the twentieth century with the renewed enthusiasm for Neoclassicism. We sense this in Louis Kahn’s abstracted application of the Pantheon as a model for several of his interior spaces. The same has been observed about Gunnar Asplund’s Stockholm Library. One critic argued that the fully roofed cylinder of Asplund’s library paradoxically seems less a covered room than the Pantheon with its open, central oculus.[116] The result, as another observer has commented, is that “the room disappears without intermission into the diffuse and infinite.”[117]

Perhaps it is fitting that in the most drastic departure from the democratic values that informed the cultural institutions of an emerging modern world, in which architects made repeated recourse to the Pantheon as model, the psychological and spiritual effects of the sublime would most likely have been aborted. Adolf Hitler had a long-standing fascination with the Pantheon, which he adapted in modified form in his project for a gigantic Grosse Halle (Great Hall) that he wished to build in a prominent location in Berlin. Subsequently aided in the design of the Grosse Halle by his official architect Albert Speer, who further developed Hitler’s earlier sketches from the 1920s, Hitler envisaged a building so large that that it would accommodate a crowd of 150,000–180,000 people (Fig. 13.14). With its dome projected to rise 825 feet, the Great Hall, to borrow a phrase from Speer himself, was truly on a “megalomaniac” scale.[118]

13.14. Albert Speer, after Adolf Hitler, central axis with Grosse Halle (project), Berlin, ca. 1937–1941.

For Hitler and Speer, size was significant because it corresponded to their understanding of grandeur, as well as to the need for an appropriate setting for the vast crowd. Both men had relished the electrifying effect that their Nazi festivals with large crowds could have on the psyche, as people were emotionally swept away by the chanting throngs at the Nuremberg Nazi Party rallies, where 100,000 regimented men marched to the approval of 100,000 spectators.[119]

Yet grandeur in architecture had its dangers as well as it possibilities. As Boullée had observed when criticizing St. Peter's in Rome for not conveying adequately its vast size, the parts of this building were simply too "colossal in proportion: ... thinking, as artists say, of 'doing something grand,' [the architect mistakenly] made something 'gigantic.'"[120] At one point, Speer came to the same realization about his and Hitler's Grosse Halle. He began to doubt whether transforming the outdoor rituals of the Nuremberg rallies into an indoor event within the Pantheon-inspired Grosse Halle would be effective. While designing the building, Speer traveled to Rome to visit St. Peter's an edifice, as Speer explained, that "would have fitted several times over" in the Grosse Halle. In effect, Speer boasted that the Grosse Halle "would contain sixteen times the volume of St Peter's."[121] Yet upon entering St. Peter's, Speer was surprised to find that its gigantic interior, so

much smaller than his and Hitler's own projected edifice, was scaled in such a way that he found it difficult to relate to its architecture.[122] "I was disappointed," he later wrote in his memoirs,

> that its size has no relationship to the impression on the observer. Already with this order of magnitude, I now recognized, the impression is no longer proportional to the size of the building. I then feared that the effect of our Great Hall would not correspond to Hitler's expectations.[123]

This Nazi project teaches an important lesson about the experience of architecture and points to the source of the Pantheon's ultimate appeal. As August Schmarsow had written in a prescient essay of 1893, "The Essence of Architectural Creation":

> As the creatress of space, architecture creates, in a way no other art can, enclosures for us in which the vertical middle axis is not physically present but remains empty.... The spatial construct is, so to speak, an emanation of the human being present, a projection from within the subject, irrespective of whether we physically place ourselves inside the space or mentally project ourselves into it.[124]

The Pantheon, with its implied but empty central axis under the light of the central oculus and with its cylindrical chamber capped with a hemispherical dome, presents the archetypical architectural configuration of the "essence" of this architectural experience at the optimal size. For this reason, Louis Kahn was able to correctly opine, with a twinkle in his eye, that the Pantheon was a perfect building except for one fault: it had a door.[125]

Applying Schmarsow's explanation to the Pantheon, we can see, as Kahn subtly hinted, that having arrived at the threshold of the Pantheon's interior, we already occupy the space fully, imagining ourselves at the center and filling the vast cavity with our sense of self, what the Germans in Schmarsow's circle of *Einfühlung* philosophers termed *Raumgefühl*, the feeling of space, which, in turn, involved *Körpergefühl,* the feeling of the body, and *Vitalgefühl,* the feeling of life forces. This Boullée understood when he designed his Cenotaph to Newton with entrance into the spherical cavity immediately at the center, alongside Newton's sarcophagus, "the only material object"[126] in the enveloping space. In this way, the visitor identifies with the central tomb while projecting himself or herself, to use Schmarsow's terminology, into the circumambient space. Boullée, like Kahn, had intuited what Schmarsow would elucidate with the words of a philosopher of aesthetics: "As soon as we have learned to experience ourselves and ourselves alone as the center of this space, whose coordinates intersect in us, we have found the precious kernel ... on which architectural creation is based."[127] In the Pantheon, these coordinates are infinite and all-encompassing, expanding to all sides of a virtually perfect spherical cavity whose dimensions and whose architectural surface treatment are the embodiment of perfection, a perfection that gives an understanding of the individual's place in the universe that is unique in the history of world architecture.

1 William L. MacDonald, *The Pantheon: Design, Meaning, and Progeny,* Cambridge, Mass., 1976

(3d printing 1981), pp. 94–132, Chapter 5. MacDonald's survey includes a spate of cylindrical and domed temples and tombs of the late Roman and Hellenistic periods; various Renaissance churches, ranging from Bramante's project for rebuilding the basilica of St. Peter's to Palladio's chapel at Maser, as well as Palladio's Villa Rotunda; numerous Baroque churches of the seventeenth century, including Bernini's S. Andrea al Quirinale; a host of eighteenth-century and early nineteenth-century Neoclassical edifices of various building types, ranging from the anatomy theater of Jaques Gondoin's School of Surgery in Paris to Pietro Bianchi's Church of S. Francesco di Paola in Naples as well as diminutive pavilions in eighteenth-century gardens; a nineteenth-century historical revival edifice, such as Thomas Jefferson's Rotunda at the University of Virginia, and a utilitarian structure that employed the new building material of iron, such as François-Joseph Bélanger's dome over the Paris Grain Hall (Halle au Blé); and finally, two twentieth-century churches in Rome by Marcello Piacentini built shortly after World War II.

2 Nul ne doit être inquiété pour ces opinions, mêmes religieuses, pourvu que leur manifestation ne trouble pas l'ordre public établi par la loi.

3 David Watkin and Tilman Mellinghoff, *German Architecture and the Classical Ideal*, Cambridge, Mass., 1987, p. 24; Barry Bergdoll, *European Architecture, 1750–1890*, Oxford 2000, p. 70.

4 On the history of this church, see Watkin and Mellinghoff 1987, p. 24.

5 Watkin and Mellinghoff 1987, pp. 175–176, 223.

6 Alan Braham, *The Architecture of the French Enlightenment*, Berkeley 1980, p. 52.

7 Braham 1980, pp. 54–55 (Fig. 63).

8 George Wilson Pierson, "Tocqueville's Essay on American Government and Religion," excerpt from *Tocqueville and Beaumont in America*, 1831, available at http://xroads.virginia.edu/~HYPER/DETOC/religion/piers152.html.

9 William H. Jordy, *American Buildings and Their Architects*, Garden City, N.Y., 1972, vol. 4, p. 311, repeated in Neil Levine, *The Architecture of Frank Lloyd Wright*, Princeton 1996, p. 487 n. 171.

10 On Wright and classicism, see Patrick Pinnell, "Academic Tradition and the Individual Talent: Similarity and Difference in Wright's Formation," in *On and By Frank Lloyd Wright: A Primer of Architectural Principles*, ed. Robert McCarter, London 2005; on the Unity Temple and Cenotaph

project, see Richard A. Etlin, *Symbolic Space: French Enlightenment Architecture and Its Legacy*, Chicago 1994, pp. 176–179.

11 S.v. “Harvey, William Henry,” in Judith S. Levey and Agnes Greenhall, eds., *The Concise Columbia Encyclopedia*, New York 1983, p. 366.

12 S.v. “Newton, Sir Isaac,” in Levey and Greenhall 1983, p. 596.

13 Richard A. Etlin, *The Architecture of Death: The Transformation of the Cemetery in Eighteenth-Century Paris*, Cambridge, Mass., 1984, pp. 30–31, 33, and 93.

14 Braham 1980, pp. 138–139 (for the entire paragraph).

15 Braham 1980, p. 141.

16 Julien Offroy de La Mettrie, *L’Homme-Machine*, ed. J. Assézat, Paris 1865, p. 28.

17 de La Mettrie, p. 124.

18 Sandra Blakeslee, “Cells That Read Minds,” *New York Times*, January 10, 2006, F1 and F4.

19 For a more extensive account of the popularization of Newton’s ideas, see Adolf Max Vogt, *Boullées Newton-Denkmal: Sakralbau und Kugelidee*, Basel 1969, Chapter 10, pp. 291–314.

20 This characterization is found in the program published in Pierre-Louis Van-Cléemputte and Amant-Parfait Prieur, *Collection des prix que la ci-devant Académie d’Architecture proposoit et couronnoit tous les ans*, Paris 1787–1796, cahier 12, Plate 3, which accompanies the engraving of Pierre-Jules Delespine’s Cenotaph to Newton. Delespine, in a publication dating from 1827, claimed that his project was the winner of a Prix d’émulation in 1785. In “*Les Prix de Rome*”: *Concours de l’Académie royale d’Architecture au XVIIIe siècle*, Paris 1984, p. 233, Jean-Marie Pérouse de Montclos explains that this may indeed have been the monthly competition of January 1785, not recorded in the *Procès-verbaux* edited and published by Henry Lemonnier.

21 Etienne-Louis Boullée, *Architecture, essai sur l’art*, ed. Jean-Marie Pérouse de Montclos, Paris 1968, pp. 137–138 (fols. 126v-127). My translation here and throughout.

22 Boullée 1968, pp. 87–88 (fol. 92v).

23 Boullée 1968, p. 82 (fol. 89).

24 Donald Drew Egbert, *The Beaux-Arts Tradition in French Architecture, Illustrated by the "Grand Prix de Rome,"* ed. David Van Zanten, Princeton 1980, p. 5.

25 The description of Gay's project can be found in a series of annotated tracings of the Grand Prix designs at the Cabinet des Dessins, Musée des Arts Décoratifs, Paris. According to Werner Szambien, these early nineteenth-century tracings were probably by Antoine-Marie Peyre (Werner Szambien "Notes sur le Receuil d'Architecture privée de Boullée (1792–1796)," *Gazette des Beaux-Arts* 94, no. 1346, 1981, pp. 111–124; p. 115). For illustrations and a more complete account, see Etlin 1984, pp. 139–146.

26 For illustrations of the funerary projects discussed in this section, see Etlin 1984.

27 Louis I. Kahn, "Talks with Students," Rice University, 1964, in AlessandraLatour, ed., *Louis I. Kahn: Writings, Lectures, Interviews*, New York 1991, p. 168.

28 Kazi Khaleed Ashraf, "Louis I. Kahn: National Capital of Bangladesh, Dhaka, Bangladesh, *Global Architecture* 72, 1994, pp. 1–47; p. 47.

29 Louis I. Kahn, "New Frontiers in Architecture," CIAM (International Congresses of Modern Architecture) in Otterlo, Netherlands, 1959, in Latour 1991, p. 84.

30 See also, Kahn, "Space and Inspirations," lecture for the symposium "The Conservatory Redefined" at the New England Conservatory, November 14, 1976, in Latour1991, p. 227: "All buildings, therefore, do not belong to Architecture. The Pantheon is an example of what is made in the domain Architecture and not in the domain Market Place. It expresses uninfluenced directions toward the making of its space as an institution of man, as it would direct the making of a place of learning, a place of government, a place of the home, places of well-being, giving them each the space environment aspiring to their dedications." For a further consideration of this theme, in its relationship to the architecture of Boullée, Cret, and Kahn, see Richard A. Etlin,*Symbolic Space: French Enlightenment Architecture and Its Legacy,* Chicago 1994, pp. 13–24 ("The Space of Clarity") and 48–87 (Chapter 3, "Character and Design Method").

31 Louis I. Kahn, "A Statement by Louis I. Kahn,"*Arts + Architecture* 81, no. 5, 1964, pp. 18–19 and 33; p. 33. This passage, which accurately transcribes the typescript (Box 59, The Louis I. Kahn

Collection, University of Pennsylvania), is nonetheless awkward in its wording and also appears to be missing a word, which I have inserted in brackets. Unfortunately, the transcription in Latour 1991, p. 151, taken from the published article, confuses matters further by introducing a typographical error: "There is a demand from saying nothing specific, no direction ..." (Louis I. Kahn, "A Statement" (a paper delivered at the International Design Conference, Aspen, Colorado, 1962), in Latour 1991, pp. 145–152; p. 151). In his anthology of Kahn's writings, Robert Twombly gives a "lightly corrected and amended" (p. 151) text: "And there is a demand that form say nothing specific, no direction ..." (Louis I. Kahn, "Lecture at International Design Conference, Aspen, Colorado, [1962]," in Louis I. Kahn, *Louis Kahn: Essential Texts*, ed. Robert Twombly, New York 2003, pp. 151–161; p. 160). I am grateful to Raffaella Fabiani Giannetto for verifying the archival transcript.

32 Louis Kahn, "Twelve Lines," in *Visionary Architects: Boullée, Ledoux, Lequeu*, University of St. Thomas, Houston, October 19, 1967–January 3, 1968, exh. cat., Houston 1968, p. 9.

33 Boullée 1968, p. 91 (fols. 94–94v).

34 For illustrations of the domes designed successively by Benjamin Latrobe, Charles Bulfinch, and Thomas U. Walter, see Mary Louchheim Lieberthal, *Designing a Nation's Capitol: Controversy and Compromise*, New Orleans Museum of Art, September 18–October 24, exh. cat., New Orleans 1976.

35 Pamela Scott, "Charles Bulfinch: Well-Connected, Refined Gentleman Architect," in Donald R. Kennon, ed., *The United States Capitol: Designing and Decorating a National Icon*, Athens, Ohio, 2000, p. 60.

36 James Leith, *Space and Revolution: Projects for Monuments, Squares, and Public Buildings in France, 1789–1799*, Montreal 1991, pp. 78–117 (Chapter 4, "Temples for the Nation and Its Heroes").

37 Braham 1980, p. 141; Ian Robertson, ed., *Paris and Environs*, The Blue Guides, London 1977, pp. 70 and 77.

38 Talbot Hamlin, *Benjamin Henry Latrobe*, New York 1955, p. 288 and Plate 29.

39 Boullée 1968, p. 138 (editor's n. 116); Helen Rosenau, *Social Purpose in Architecture: Paris and London Compared, 1760–1800*, London 1970, pp. 126–127 with illustrations; MacDonald 2002, p. 124.

40 Rosenau 1970, pp. 116–117 with illustration: "Un globe, en tous les tems, n'est égal qu'à lui-

même;/ C’est de l’égalité le plus parfait embleme.”

41 In Boullée 1968, p. 138 n. 116, Pérouse de Montclos dates the Temple to the Earth to 1790 and the Temple to Equality to 1794. In *Space and Revolution,* p. 179, Leith maintains that the architect’s note on the rear side of the drawing of the Temple to the Earth affirms that he had exhibited it in 1794.

42 Leith 1991, pp. 178–180 and Figs. 198–202.

43 Leith 1991, pp. 166–181, especially Fig. 191 (Crozier, Project for a Temple to Equality).

44 Susanna Pasquali, Chapter Eleven in this volume. See also her earlier essay, “From the Pantheon of Artists to the Pantheon of Illustrious Men: Raphael’s Tomb and Its Legacy,” in Richard Wrigley and Matthew Craske, eds., *Pantheon: Transformation of a Monumental Idea*, Aldershot 2004, pp. 35–56.

45 Etlin 1994a, pp. 24–29 (“The Space of Emulation”). For a more extensive treatment of this theme, see Judith Colton, *The* Parnasse François*: Titon du Tillet and the Origins of the Monument to Genius*, New Haven 1979.

46 Etlin 1984, pp. 101–109, 282–290 (illustrations).

47 As quoted in Nikolaus Pevsner, *A History of Building Types*, The A. W. Mellon Lectures in the Fine Arts 1970, Bollingen Series 35.19, Princeton 1976, p. 126.

48 Andrew McClellan, *Inventing the Louvre: Art, Politics, and the Origins of the Modern Museum in Eighteenth-Century Paris*, New York 1994, pp. 2–4.

49 MacDonald 2002, p. 125; Pevsner 1976, pp. 107–108.

50 McClellan 1994, pp. 51–52.

51 McClellan 1994, pp. 13 and 49.

52 Pevsner 1976, p. 118 (Fig. 8.14); Egbert 1980, p. 172. The gallery with Pantheon-like dome would reappear in the second prize of the Grand Prix of 1791, as well as in the actual Museo Pio-Clementino (ca. 1773–1780), built in the Vatican complex of buildings by Michelangelo Simonetti

and then Giuseppe Camporesi, where the sculpture display "culminat[ed] in the [Pantheon-like coffered] Rotunda as the room for the major deities" (Pevsner 1976, pp. 116–117 [Fig. 8.11]).

53 Henry Lemonnier, ed., *Procès-verbaux de l'Académie royale d'Architecture 1671–1793*, Paris 1924, vol. 8, p. 377 (May 3, 1779); Van-Cléemputte and Prieur 1787–1796, cahier 1, Plate 1.

54 Pérouse de Montclos 1984, pp. 162–166 with illustrations; Egbert 1980, p. 175.

55 Pevsner 1976, p. 122 (Fig. 8.26).

56 McClellan 1994, p. 58.

57 On the eighteenth-century idea of placing the busts of the great men of France in public buildings, see Etlin 1994a, pp. 25–26.

58 I am referring to Boullée's project for a public library on the site of the Capucines Monastery, where the blank front facade is broken in the middle by a broad line of columns spaced two deep and constituting the front face of an entrance porch further defined by a double row of columns to the rear, which, in turn, constitute the front of a sanctuary-like semicircular entrance court. For an illustration, see Pevsner 1976, p. 103 (Fig. 7.29).

59 Here I differ with Pevsner, who, in *A History of Building Types*, argues that both the front colonnaded porch and the central rotunda of Schinkel's Altes Museum were "clearly inspired by Durand" (p. 127). Neither Durand's single row of entrance columns nor his modestly sized central rotunda compare with Schinkel's grander development of both features, which follow upon the example set by Boullée and Percier.

60 "The only objections [to Schinkel's memorandum of January 8, 1823, to the king] came from Hirt, who criticised Schinkel's basic ideas for the building, especially the rotunda and colonnaded front, on the grounds of their lack of utility." (Gottfried Riemann, "View of the Interior of the Rotunda of the Altes Museum," cat. entry 56 in Michael Snodin, ed., *Karl Friedrich Schinkel: A Universal Man*, New Haven 1991, pp. 130–132; p. 131.

61 Pevsner 1976, p. 127.

62 Karl Friedrich Schinkel, "Comment on the Report of Hofrat Hirt of February 5, 1823," as quoted in Riemann's entry 56 in Snodin 1991, p. 132 (punctuation and spelling modified).

63 Riemann in Snodin 1991, p. 132.

64 Riemann in Snodin 1991, p. 132.

65 On Friedrich Gilly's visit to Paris and his relationship with Schinkel, see Watkin and Mellinghoff 1987, pp. 69–72, 85–86.

66 Leo von Klenze, as quoted in *Ein griechischer Traum: Leo von Klenze. Der Archäologe*, Glyptothek, December 6, 1985–February 9, 1986, exh. cat., Munich 1985, p. 338 (my translation).

67 See note 9.

68 Joan M. Lukach, *Hilla Rebay: In Search of the Spirit in Art*, New York 1983, pp. 183–184 and 208; Levine 1996, p. 299.

69 Rebay to Wright, August 12, 1943, in Lukach 1983, p. 187, and Levine 1996, pp. 320–321.

70 Levine 1996, p. 319, Rebay to Wright, June 23, 1943, as quoted from Lukach 1983, p. 186. With respect to Rebay's use of the word "dome," Lukach explains: "Her occasional use of the phrase 'dome of the spirit,' which she used interchangeably with 'cathedral' or 'temple,' was an inadvertently suggestive lapse into another language, *Dom* being the German word for cathedral. The phrase conjures up the vision of a lofty and circular interior space – and in 1939, Rebay herself made a sketch for a circular exhibition gallery, all on one level with no stairs, making use of an ingenious flow of traffic from gallery to gallery" (p. 187).

71 Levine 1996, p. 298, Fig. 291: 1943–1944 Schemes A/D.

72 Wright to Rebay, July 25, 1945: "The model is up to the *Dome*" (his italics), in Lukach 1983, p. 191.

73 For illustrations, see Rebay 1983, Figs. 41–42 (1944–1945), and Levine 1996, p. 329, Fig. 319 (September 1945) and p. 338, Fig. 326 (1951).

74 Levine 1996, p. 342.

75 On the Unity Temples as exemplifying this ideal of organic architecture, see Richard A. Etlin,

Frank Lloyd Wright and Le Corbusier: The Romantic Legacy, Manchester 1994, pp. 47–48, and 206 n. 144, with account from Edgar Tafel, *Apprentice to Genius: Years with Frank Lloyd Wright* 1979, pp. 71–72.

76 See MacDonald 2002, p. 74, and William C. Loerke, "A Rereading of the Interior Elevation o Hadrian's Rotunda," *Journal of the Society of Architectural Historians* 49, no. 1, pp. 22–43; p. 42.

77 Levine 1996, p. 487 n. 173.

78 Levine 1996, p. 348.

79 Frank Lloyd Wright, *An Autobiography*, New York 1932, pp. 154 and 156.

80 Levey and Greenhall 1983, s.v. "Encyclopedia," p. 266.

81 Boullée 1968, p. 127 (fol. 119v). The *Encyclopédie* had characterized the Royal Library as follows: "It is one of the most noble institutions. There is no expense more magnificent and more useful" (as quoted in French in Fritz Milkau and Georg Leyh, eds., *Handbuch der Bibliothekwissenschaft*, 4 vols., 2nd rev. ed., Wiesbaden 1957–1961; vol. 3, p. 14 [my translation]).

82 Milkau and Leyh 1957–1961, vol. 2, pp. 863–867; vol. 3, pp. 10–11 and 14. See also, Dorinda Outram, *The Enlightenment*, 2nd ed., Cambridge 2005, pp. 16–17, who, reviewing the research of more recent scholars, confirms this conclusion and summarizes the expansion of literacy and book collecting among a wide range of social classes, even among the lower classes.

83 Boullée 1968, p. 126 (fol. 119).

84 Boullée 1968, p. 130 (fol. 121v).

85 For illustrations of the project by Sobre, as well as the library design by Gisors discussed in the following, see Etlin 1994a, pp. 68–69.

86 Patricia C. Sherwood and Joseph Michael Lasala, "Education and Architecture: The Evolution of the University of Virginia's Academical Village," in Richard Guy Wilson, ed., *Thomas Jefferson's Academical Village: The Creation of an Architectural Masterpiece*, Bayly Art Museum of the University of Virginia, October 7, 1993–January 9, 1994, exh. cat., Charlottesville 1993, p. 9.

87 Paul V. Turner, *Joseph Ramée: International Architect of the Revolutionary Era*, New York 1996, pp. 197–216.

88 Benjamin Latrobe, sketch and letter of July 24, 1817, in Sherwood and Lasala 1993, p. 20 (Fig. 10).

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90 Leland M. Roth, *McKim, Mead and White, Architects*, New York 1983, pp. 188–199.

91 Claes Caldenby and Olof Hultin, eds., *Asplund*, Stockholm 1985, p. 92. For illustrations, see http://www.arkitekturmuseet.se/arkiv/, AM 1990–04–51, AM 1990–0452, AM 1990–04–54, or Stuart Wrede, *The Architecture of Erik Gunnar Asplund*, Cambridge, Mass., 1983, Figs. 100, 101, and 103.

92 Elias Cornell, "The Sky as a Vault ... Gunnar Asplund and the Articulation of Space" [his ellipsis], in Caldenby and Hultin 1985, pp. 23–33; p. 29. Cornell also notes: "In a famous essay which was also a document of its age, Carl Nordenfalk compared the Stockholm Public Library to the Pantheon" (p. 29).

93 Asplund as quoted in Cornell, "The Sky as a Vault," in Caldenby and Hultin 1985, p. 25. Cornell also quotes Asplund on Lewerentz's use of stairs to create a sense of anticipation, an effect that Asplund probably had in mind in his library design: "The original idea of the progressively higher terraces and the increasing upward gradient of the staircase have the effect of heightening expectation." (Cornell, "The Sky as a Vault," p. 25.)

94 Asplund, as quoted in Cornell, "The Sky as a Vault," in Caldenby and Hultin 1985, p. 23.

95 Asplund, as quoted in Cornell, "The Sky as a Vault," in Caldenby and Hultin 1985, p. 28. Cornell comments, "Asplund had created this room, populated by the cult objects of the time, like a miniature Pantheon."

96 Alvar Aalto, as quoted in Wrede 1983, p. 94.

97 Wrede 1983, pp. 109–110 and 233 n. 77. Here I disagree with Wrede, who believes that the Cenotaph to Newton "was a mechanical model of the universe" rather than a "represent[ation of] the interior or the mind" and that Boullée's library project "could, given its rectangular shape, hardly be

interpreted as a metaphor for the mind."

98 For an illustration, see http://www.arkitekturmuseet.se/arkiv/, AM 1990–04–55, or Wrede 1983, Fig. 102.

99 Asplund as quoted in Cornell, "The Sky as a Vault," in Caldenby and Hultin 1985, p. 26.

100 Cornell twice refers to the "narrowing staircase" of the first project as a "'ladder to heaven.'" It is unclear if this phrase, presented in quotation marks, is from Asplund. Elias Cornell, "The Sky as a Vault," in Caldenby and Hultin 1985, pp. 29 and 31.

101 Karin Winter, "Den italienska resan," *Arkitektur* 6, 1985, p. 15. I am grateful to Nicholas Adams for this reference. See also, Cornell, "The Sky as a Vault," in Caldenby and Hultin1985, p. 24.

102 Leith 1991, p. 179 (Fig. 200, photograph of Lequeu's handwritten note).

103 For a longer discussion of the relationship of the Pantheon to the sublime and to its ongoing legacy, including Boullée's architecture, see Richard A. Etlin, "Architecture and the Sublime," in Timothy Costelloe, ed., *The Sublime: From Antiquity to the Present*, Cambridge 2012, pp. 230–273.

104 Boullée 1968, pp. 62–65 (fols. 77v–79v). This chapter is entitled, "De l'Essence des corps. De leurs propriétés. De leur analogie avec notre organisation."

105 Boullée 1968, p. 87 (fol. 92).

106 Lemonnier 1924, vol. 8, p. 376.

107 Edmund Burke, in *A Philosophical Enquiry into the Origin of Our Ideas of the Sublime and Beautiful*, ed. J. T. Boulton, 1759, 2nd ed., Notre Dame 1968, pp. 74–76, 139–142.

108 Boullée 1968, p. 64 (fol. 79).

109 Burke repr. 1968, p. 78.

110 [Joseph Addison], Essay no. 415, *The Spectator* (Thursday, June 26, 1712), as quoted in Marjorie Hope Nicolson, *Mountain Gloom and Mountain Glory: The Development of the Aesthetics of the Infinite*, New York 1963, p. 318. See also p. 319, and Colton 1979, p. 154.

111 John Baillie, *An Essay on the Sublime*, 1747, New York repr. 1967, p. 4 (see also p. 6). In *The Sublime: A Study of Critical Theories in XVIII-Century England,* Ann Arbor 1960, p. 73, Samuel H. Monk credits Baillie with "very nearly evolv[ing] the idea of empathy."

112 Boullée 1968, p. 139 (fol. 127v).

113 Boullée, p. 137 (fol. 127).

114 Boullée, p. 156 (fol. 138).

115 Boullée, pp. 138–139 (fol. 127v).

116 Carl Nordenfalk, as summarized by Cornell, in "The Sky as a Vault," in Caldenby and Hultin 1985, p. 29.

117 Cornell in Caldenby and Hultin 1985, p. 29. Cornell stresses that making "a room of infinite sentiment," to quote Lars Wahlman, was of interest to Asplund, Lewerentz, and their contemporaries in Finland (p. 24).

118 In his postwar memoirs, Speer entitled the chapter on the Nuremberg buildings "Gebaute Megalomanie," rendered as "Architectural Megalomania" in the translated edition of *Erinnerungen* (Berlin 1969, Chapter 5; *Inside the Third Reich*, trans. Richard and Clara Winston, New York 1970). On the evolution of the Grosse Halle project, see Frederic Spotts, *Hitler and the Power of Aesthetics*, New York 2004, pp. 357–361.

119 Spotts 2004, p. 66.

120 Boullée 1968, p. 82 (fol. 89v).

121 Speer trans. 1970, pp. 74 and 153.

122 This had been a common criticism in the eighteenth century. See Michael Petzet, *Soufflots*

Sainte-Geneviève und der französische Kirchenbau des 18. Jahrhunderts, Berlin 1961, pp. 111–112, and Richard A. Etlin, "St. Peter's in the Modern Era: The Paradoxical Colossus," in Williar Tronzo, ed., *St. Peter's in the Vatican*, New York 2005, pp. 270–304; pp. 280–283.

123 Speer, *Erinnerungen*, p. 169 (my translation).

124 August Schmarsow, "The Essence of Architectural Creation," in Harry FrancisMallgrave and Eleftherios Ikonomou, eds., *Empathy, Form, and Space: Problems in German Aesthetics, 1873-1893*, Santa Monica 1994, pp. 281–297; pp. 288–289.

125 Louis Kahn, Lecture at Princeton University, ca. 1970–1971. Unfortunately, this lecture attended by the author, is not included in the anthology of Kahn's writings edited by Alessandra Latour. Yet in Kahn's "American Institute of Architects Gold Medal Award Address" of 1971, the architect observed about the Pantheon: "The entrance door is its only impurity" (Latour 1991, p. 264).

126 Boullée 1968, p. 139 (fol. 127v).

127 Schmarsow in Mallgrave and Ikonomou 1994, pp. 286–287.

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Index